US009204199B2

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Jeong et al.

(10) **Patent No.: US 9,204,199 B2**
(45) **Date of Patent: Dec. 1, 2015**

(54) **IMAGE DISPLAY APPARATUS AND METHODS FOR OPERATING THE SAME**

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(73) Assignee: **LG Electronics Inc.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 390 days.

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(22) Filed: **Nov. 28, 2012**

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(30) **Foreign Application Priority Data**

Dec. 6, 2011	(KR)	10-2011-0129854
Apr. 3, 2012	(KR)	10-2012-0034537
Apr. 17, 2012	(KR)	10-2012-0039823
May 8, 2012	(KR)	10-2012-0048754
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Aug. 8, 2012	(KR)	10-2012-0086762

(51) **Int. Cl.**

H04N 21/482	(2011.01)
H04N 21/438	(2011.01)
H04N 21/44	(2011.01)
H04N 21/2665	(2011.01)
H04N 21/654	(2011.01)
H04N 21/658	(2011.01)
H04N 21/475	(2011.01)
H04N 21/234	(2011.01)
H04N 21/422	(2011.01)
H04N 21/433	(2011.01)

(Continued)

(52) **U.S. Cl.**

CPC ***H04N 21/4821*** (2013.01); ***H04N 5/50*** (2013.01); ***H04N 21/231*** (2013.01); ***H04N 21/25841*** (2013.01); ***H04N 21/2665*** (2013.01); ***H04N 21/4345*** (2013.01); ***H04N 21/4383*** (2013.01); ***H04N 21/44008*** (2013.01); ***H04N 21/4823*** (2013.01); ***H04N 21/654*** (2013.01); ***H04N 21/6582*** (2013.01); *H04N 21/23418* (2013.01); *H04N 21/42204* (2013.01); *H04N 21/4334* (2013.01); *H04N 21/4722* (2013.01); *H04N 21/4756* (2013.01); *H04N 21/47214* (2013.01); *H04N 21/485* (2013.01); *H04N 21/8133* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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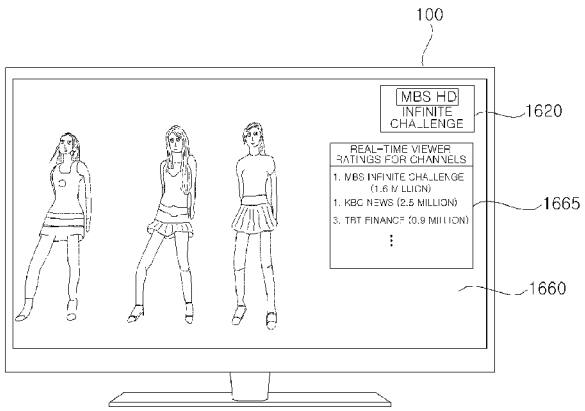
Primary Examiner — Mark D Featherstone

(74) *Attorney, Agent, or Firm* — Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

An image display apparatus, a server, and methods for operating the same are disclosed. The method for operating an image display apparatus includes displaying a broadcast program list listing a plurality of broadcast programs, receiving, upon selection of one of the plurality of broadcast programs, a broadcast signal of the selected broadcast program, and displaying the received broadcast program. The broadcast program list includes real-time viewer rating information, a thumbnail image, and a name for each of the plurality of broadcast programs.

18 Claims, 72 Drawing Sheets



(51) **Int. Cl.**

H04N 21/472	(2011.01)
H04N 21/4722	(2011.01)
H04N 21/485	(2011.01)
H04N 21/81	(2011.01)
H04N 5/50	(2006.01)
H04N 21/434	(2011.01)
H04N 21/231	(2011.01)
H04N 21/258	(2011.01)

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2013/0198768	A1*	8/2013	Kitazato	725/19

* cited by examiner

FIG. 1

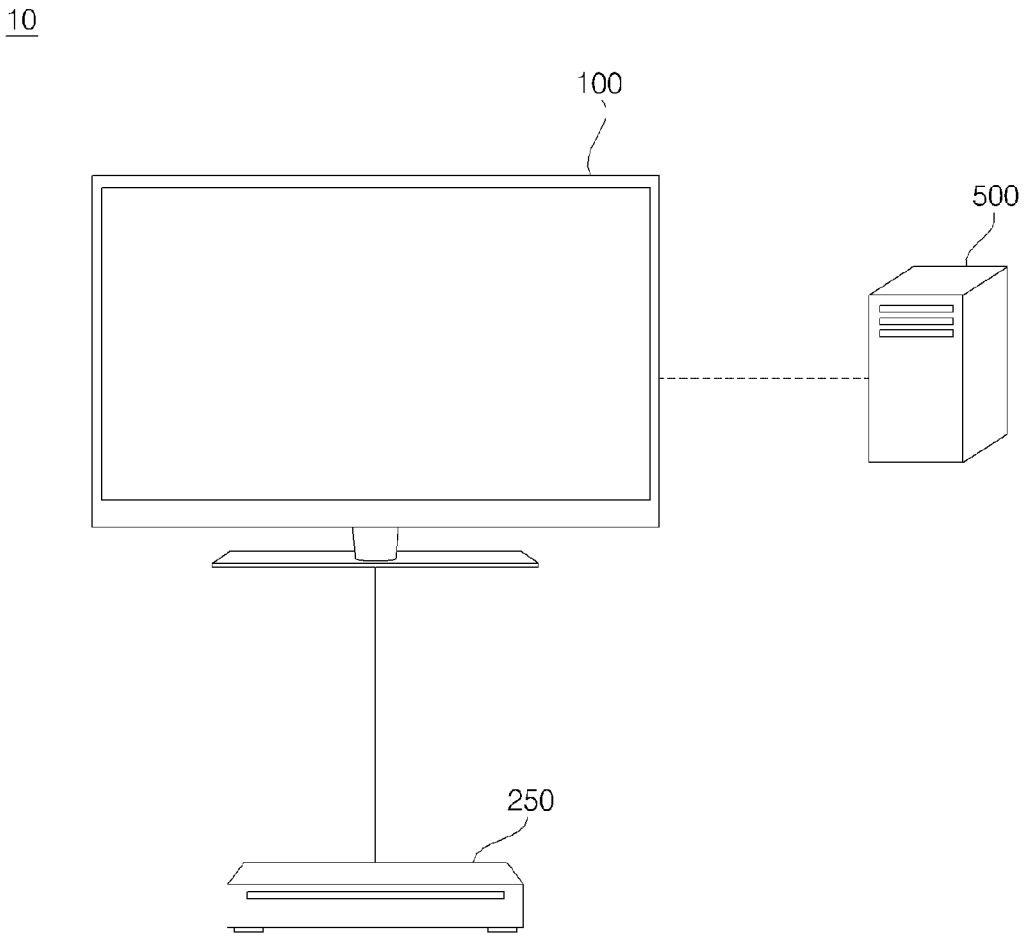


FIG. 2

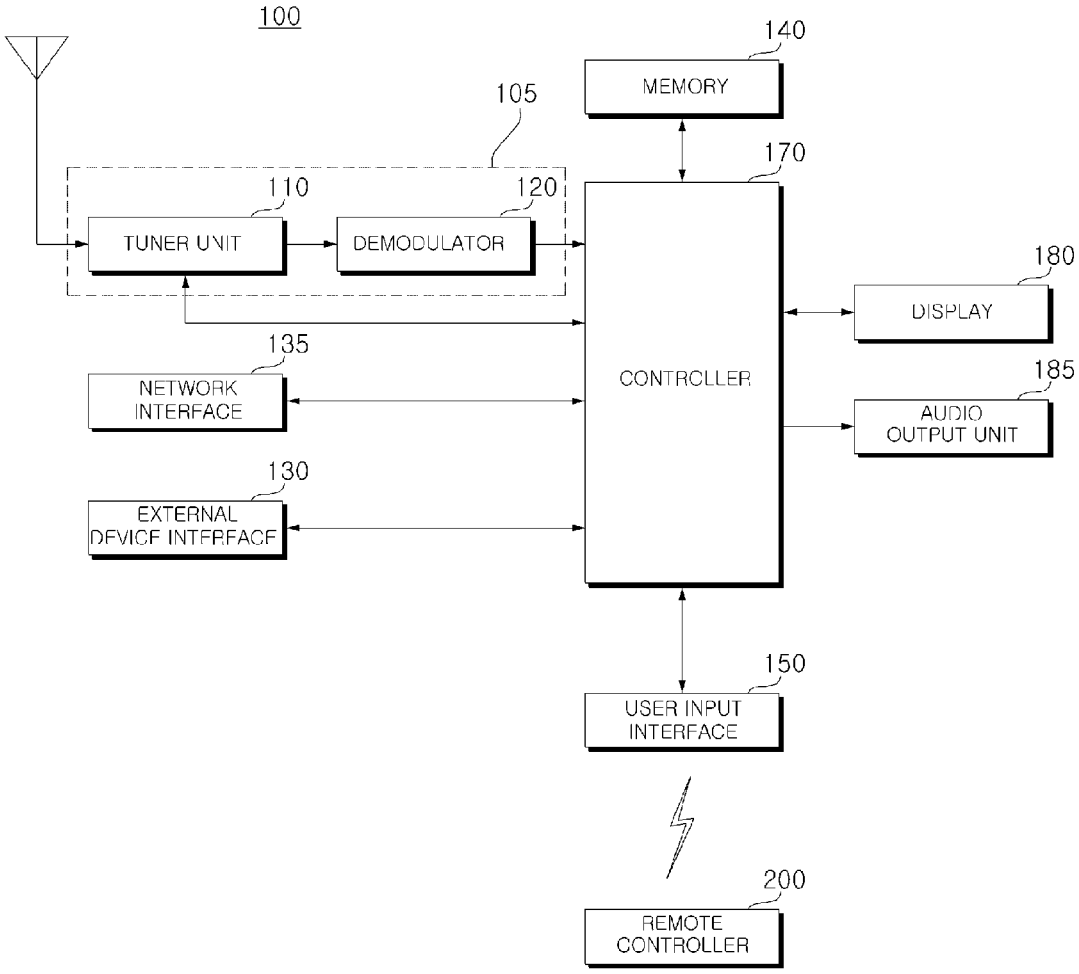

100
140
MEMORY
105
170
110
120
TUNER UNIT
DEMODULATOR
180
DISPLAY
135
NETWORK INTERFACE
CONTROLLER
185
AUDIO OUTPUT UNIT
130
EXTERNAL DEVICE INTERFACE
150
USER INPUT INTERFACE
200
REMOTE CONTROLLER

FIG. 3A

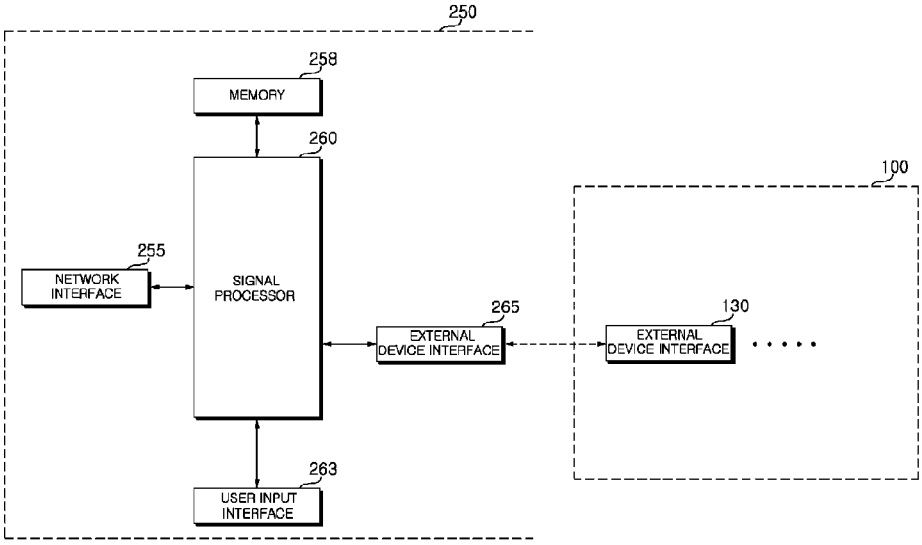

250
258
MEMORY
260
100
255
NETWORK INTERFACE
SIGNAL PROCESSOR
265
EXTERNAL DEVICE INTERFACE
130
EXTERNAL DEVICE INTERFACE
263
USER INPUT INTERFACE

FIG. 3B

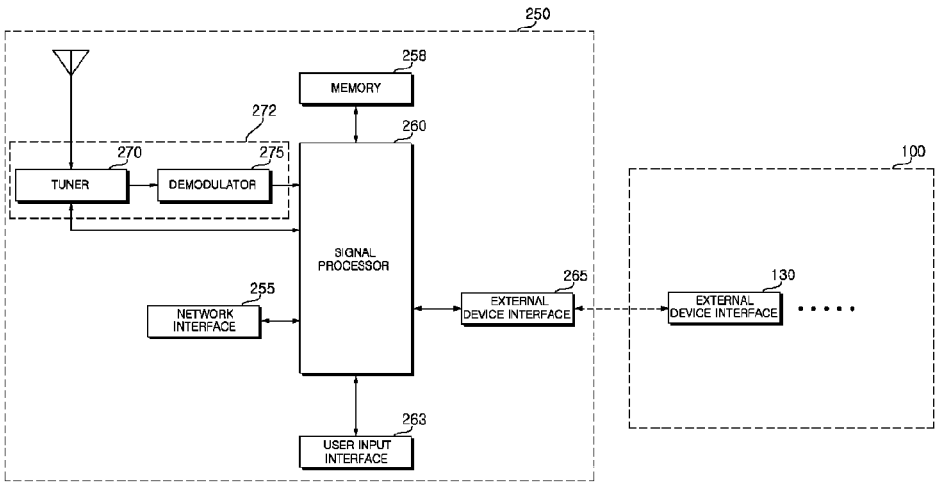

250
258
MEMORY
272
260
270
275
TUNER
DEMODULATOR
100
SIGNAL PROCESSOR
255
NETWORK INTERFACE
265
EXTERNAL DEVICE INTERFACE
130
EXTERNAL DEVICE INTERFACE
263
USER INPUT INTERFACE

FIG. 4

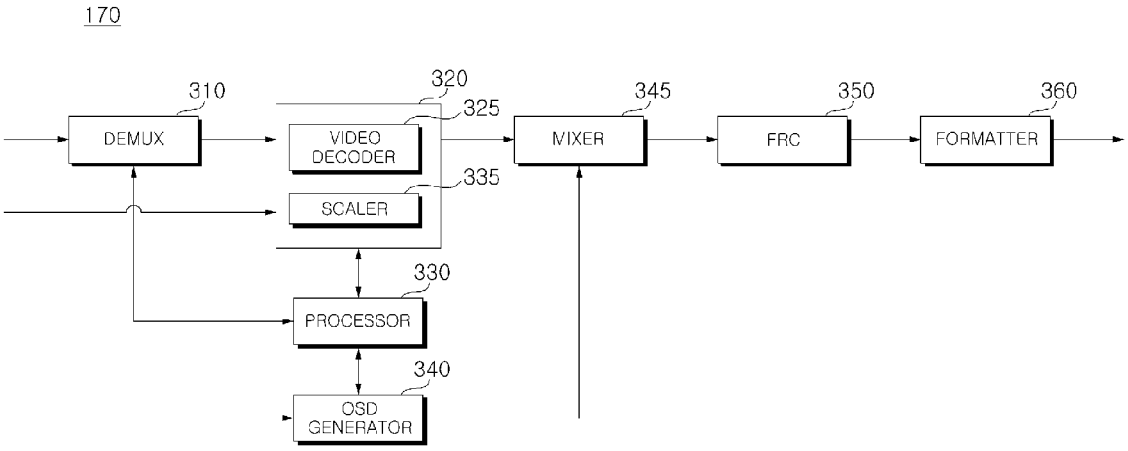

170
310
DEMUX
320
325
VIDEO DECODER
335
SCALER
330
PROCESSOR
340
OSD GENERATOR
345
MIXER
350
FRC
360
FORMATTER

FIG. 5

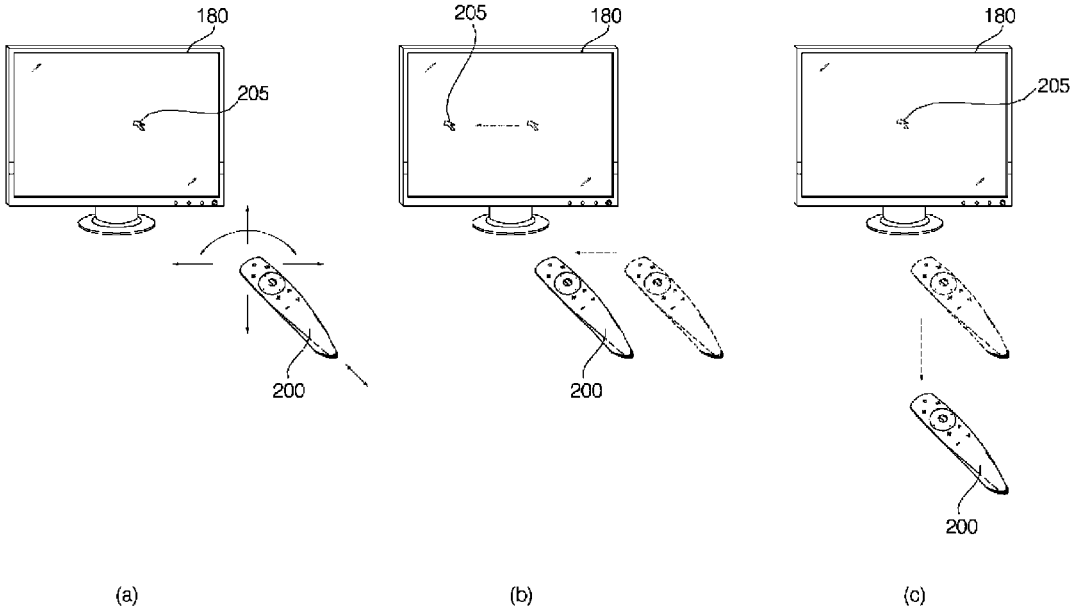


FIG. 6

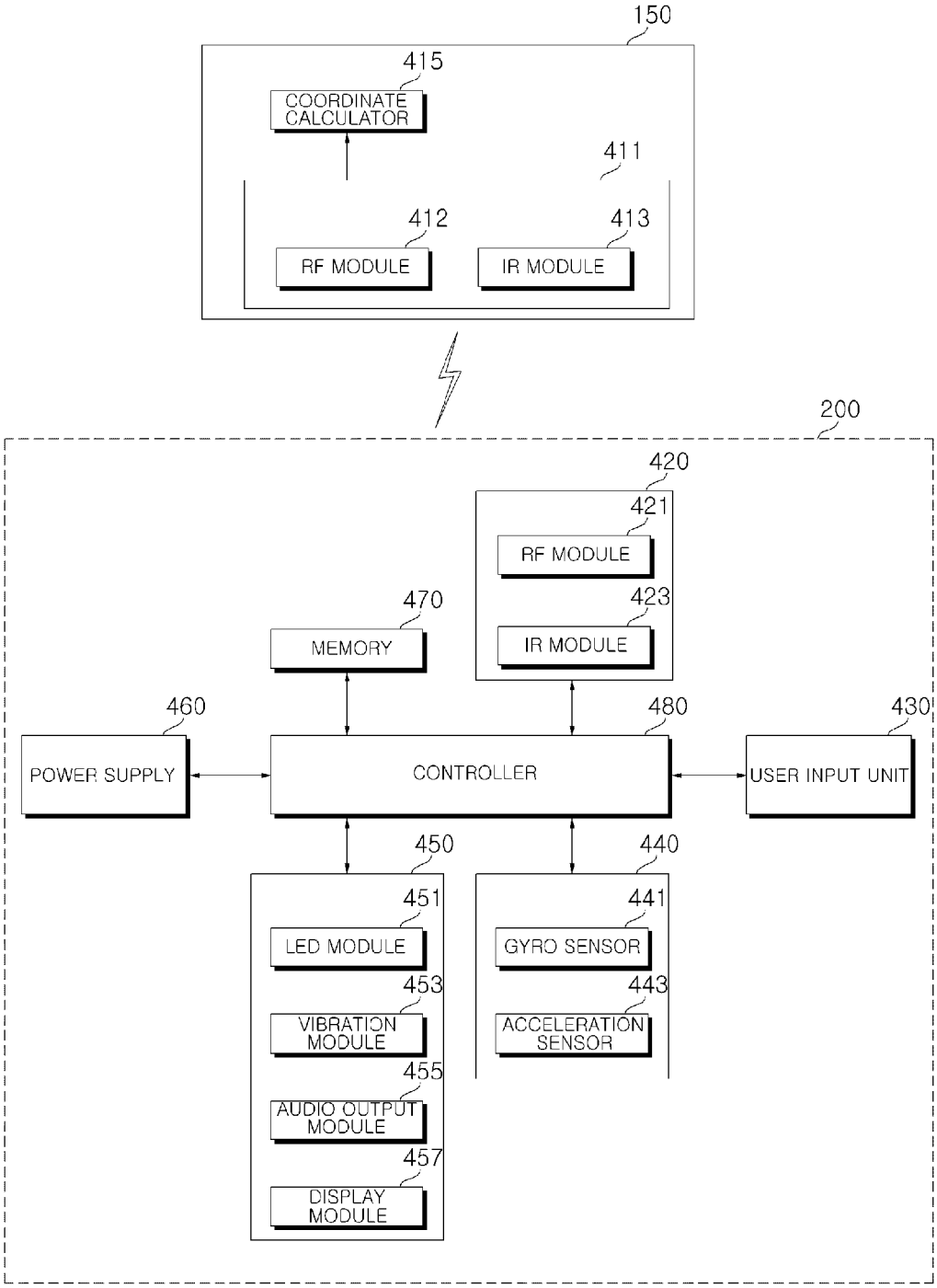

150
415
COORDINATE CALCULATOR
411
412
RF MODULE
413
IR MODULE
200
420
421
RF MODULE
423
IR MODULE
470
MEMORY
460
POWER SUPPLY
480
CONTROLLER
430
USER INPUT UNIT
450
451
LED MODULE
453
VIBRATION MODULE
455
AUDIO OUTPUT MODULE
457
DISPLAY MODULE
440
441
GYRO SENSOR
443
ACCELERATION SENSOR

FIG. 7

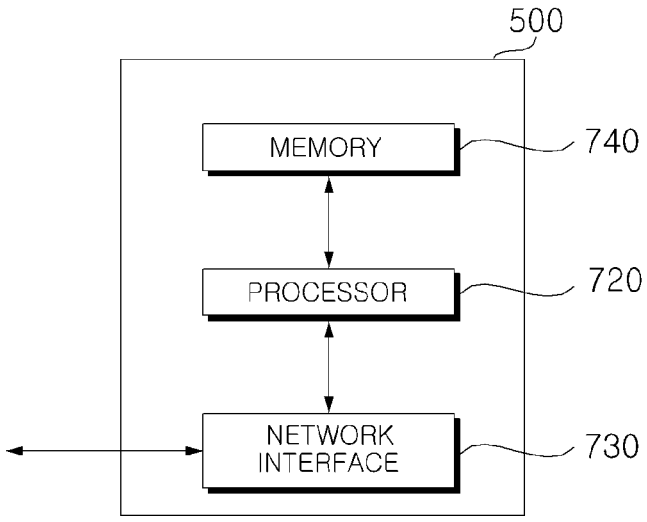


FIG. 8

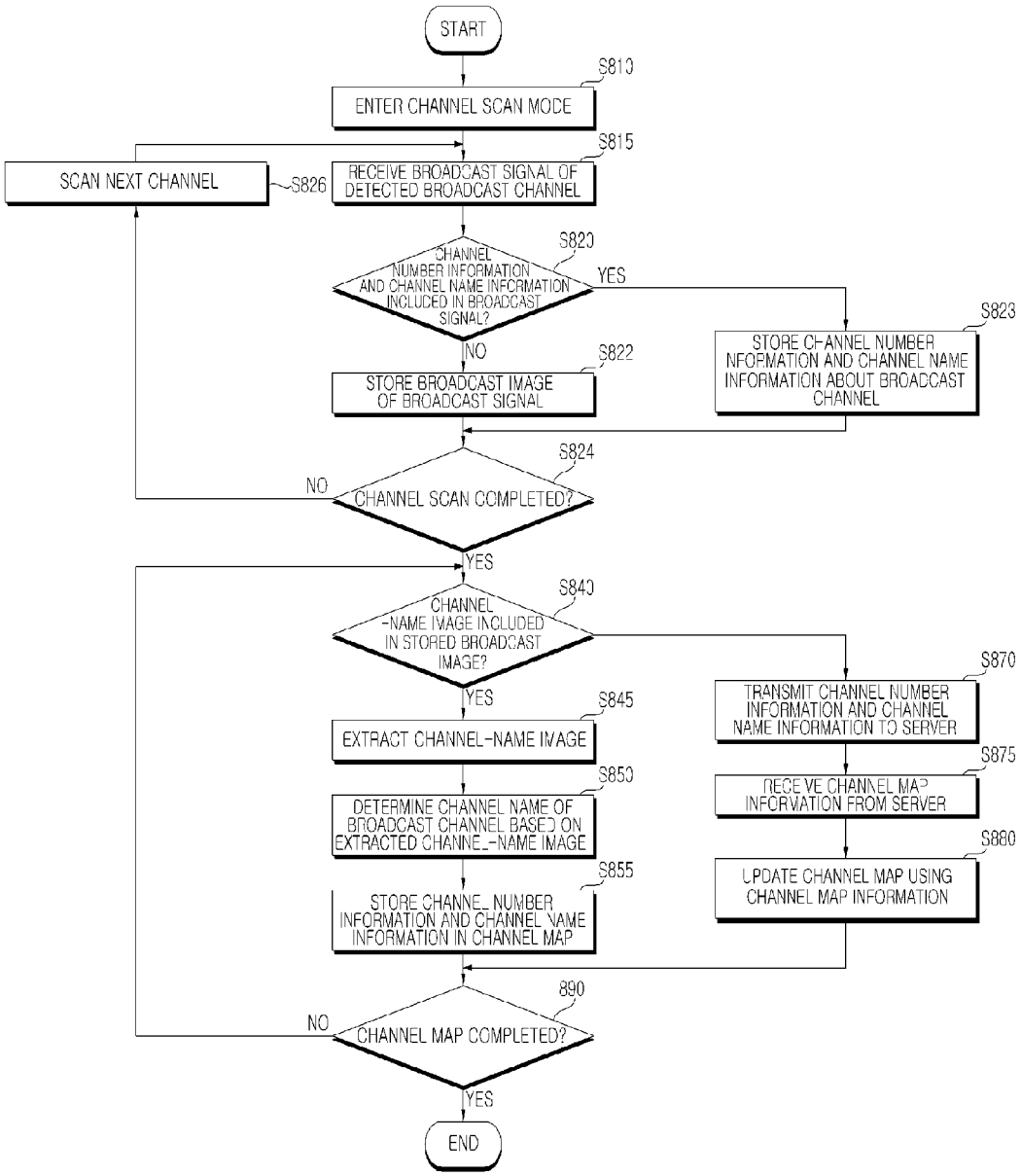

START
S810
ENTER CHANNEL SCAN MODE
S815
RECEIVE BROADCAST SIGNAL OF DETECTED BROADCAST CHANNEL
S826
SCAN NEXT CHANNEL
S820
CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION INCLUDED IN BROADCAST SIGNAL?
YES
NO
S823
STORE CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION ABOUT BROADCAST CHANNEL
S822
STORE BROADCAST IMAGE OF BROADCAST SIGNAL
S824
CHANNEL SCAN COMPLETED?
NO
YES
S840
CHANNEL-NAME IMAGE INCLUDED IN STORED BROADCAST IMAGE?
YES
S870
TRANSMIT CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION TO SERVER
S845
EXTRACT CHANNEL-NAME IMAGE
S875
RECEIVE CHANNEL MAP INFORMATION FROM SERVER
S850
DETERMINE CHANNEL NAME OF BROADCAST CHANNEL BASED ON EXTRACTED CHANNEL-NAME IMAGE
S880
UPDATE CHANNEL MAP USING CHANNEL MAP INFORMATION
S855
STORE CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION IN CHANNEL MAP
890
CHANNEL MAP COMPLETED?
NO
YES
END

FIG. 9

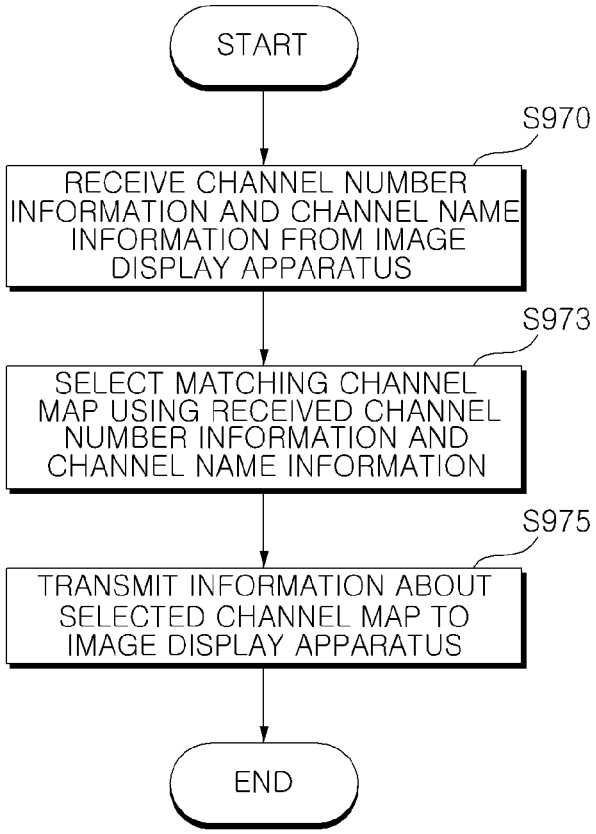

START
S970
RECEIVE CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION FROM IMAGE DISPLAY APPARATUS
S973
SELECT MATCHING CHANNEL MAP USING RECEIVED CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION
S975
TRANSMIT INFORMATION ABOUT SELECTED CHANNEL MAP TO IMAGE DISPLAY APPARATUS
END

FIG. 10

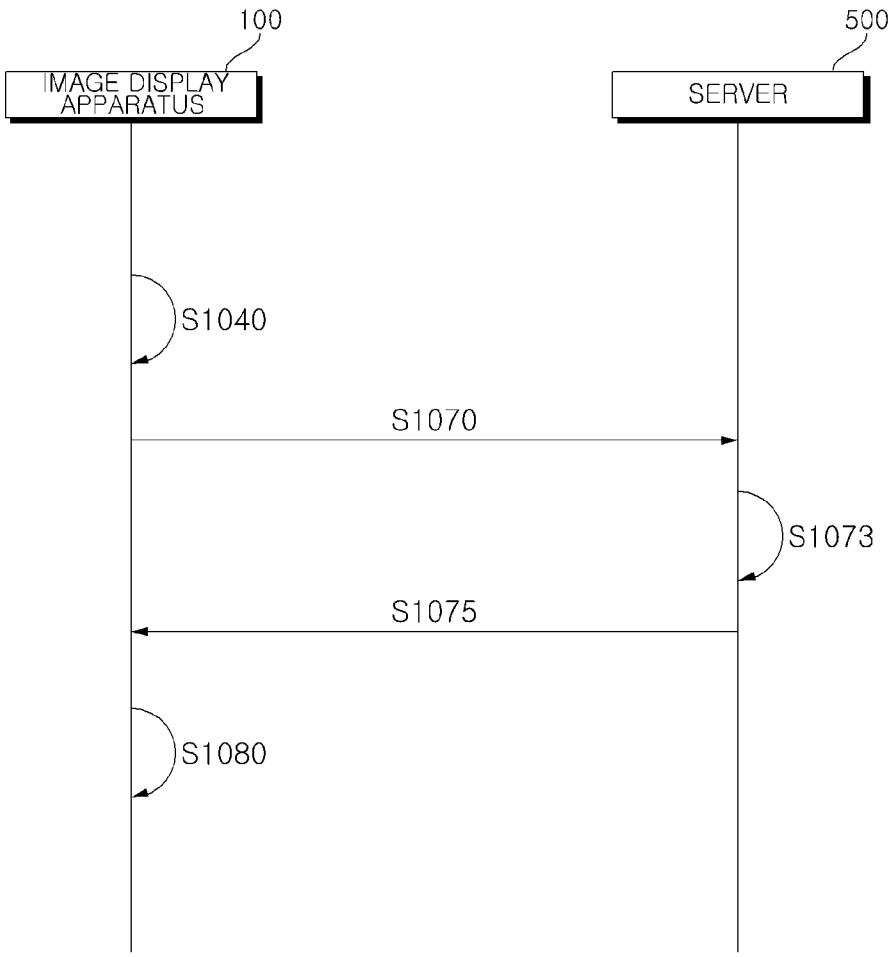

100
IMAGE DISPLAY APPARATUS
500
SERVER
S1040
S1070
S1073
S1075
S1080

FIG. 11A

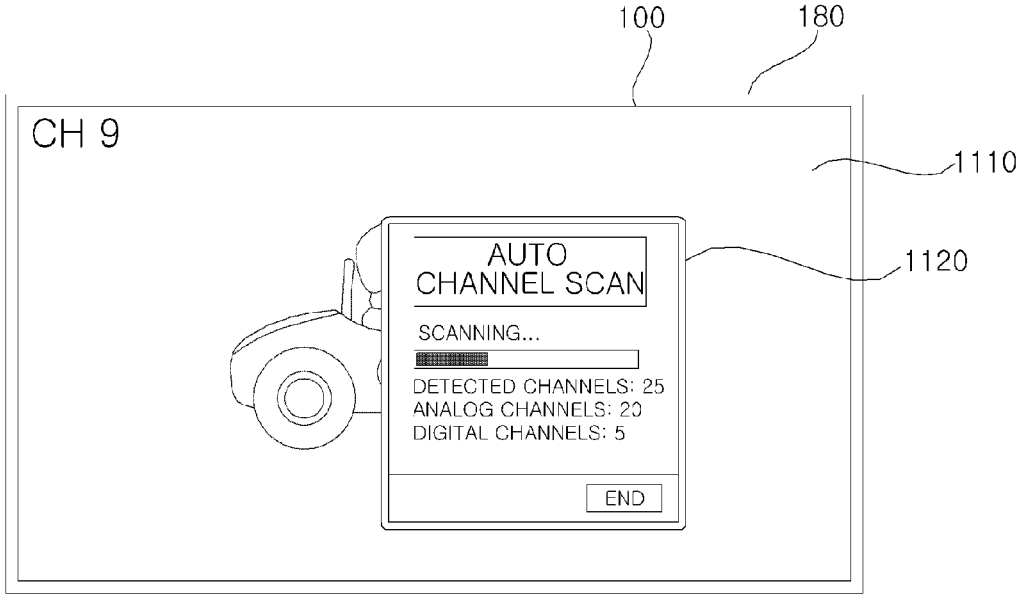


FIG. 11B

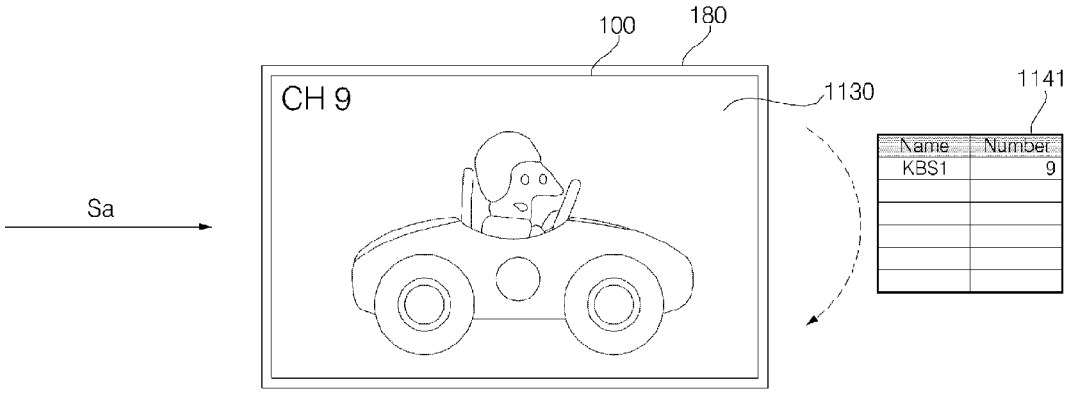


FIG. 11C

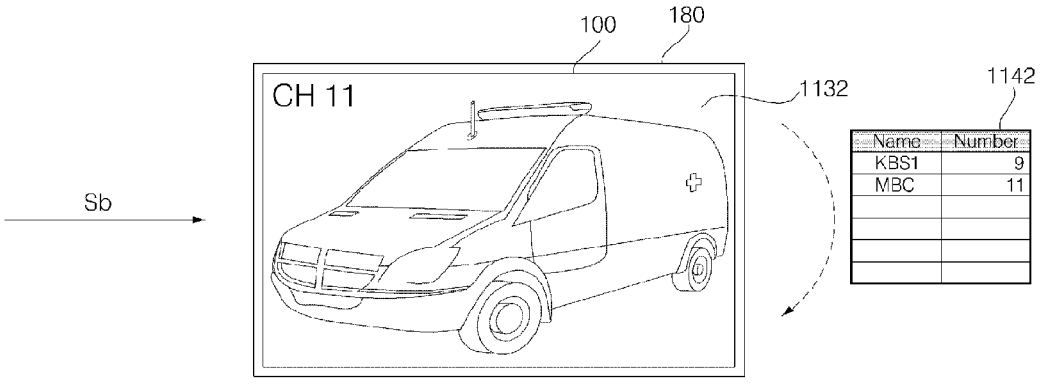


FIG. 11D

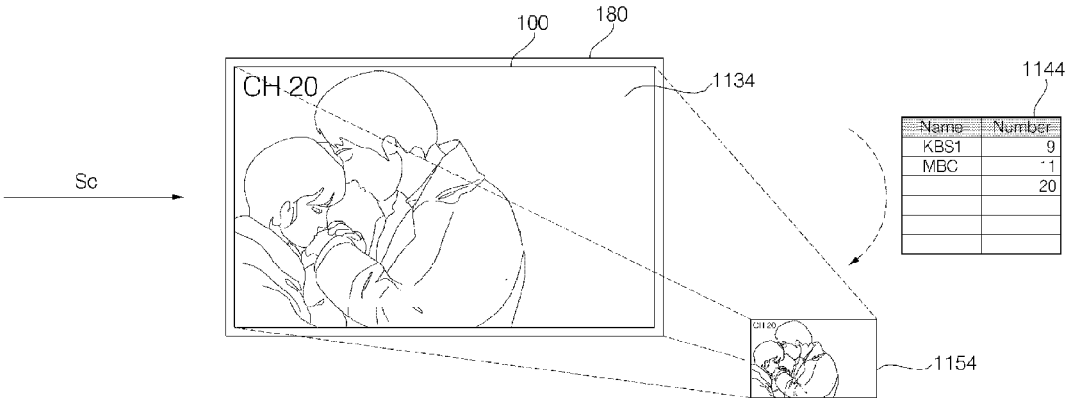


FIG. 11E

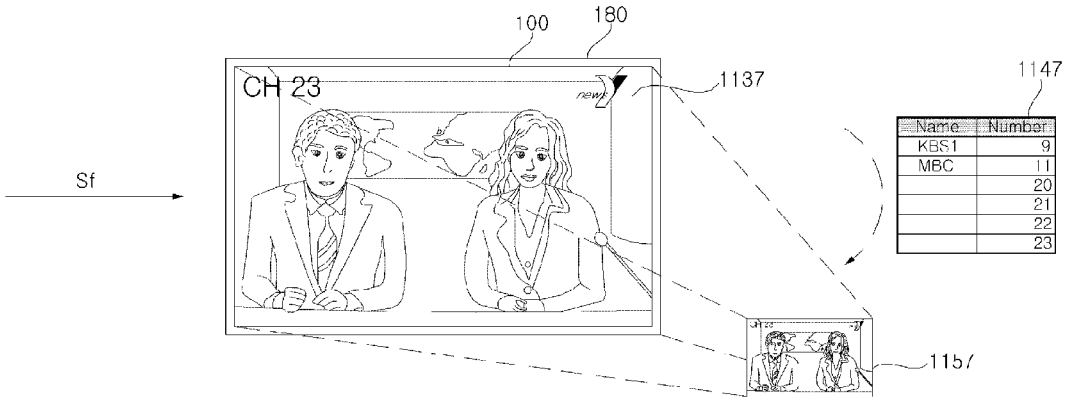


FIG. 12A

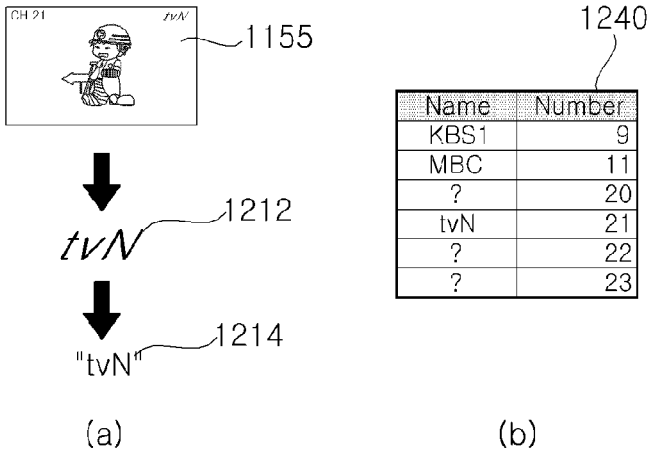
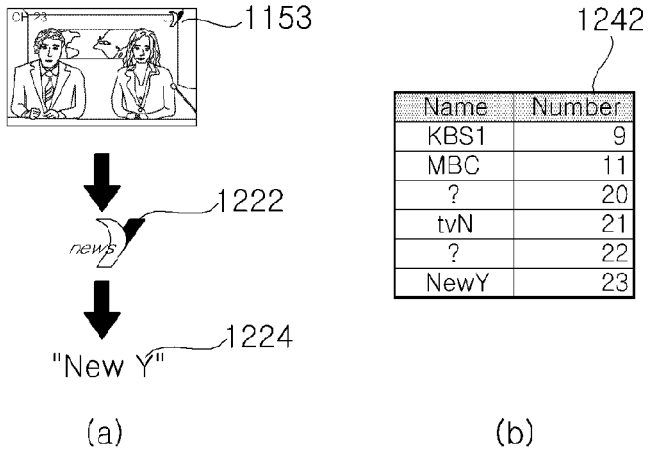
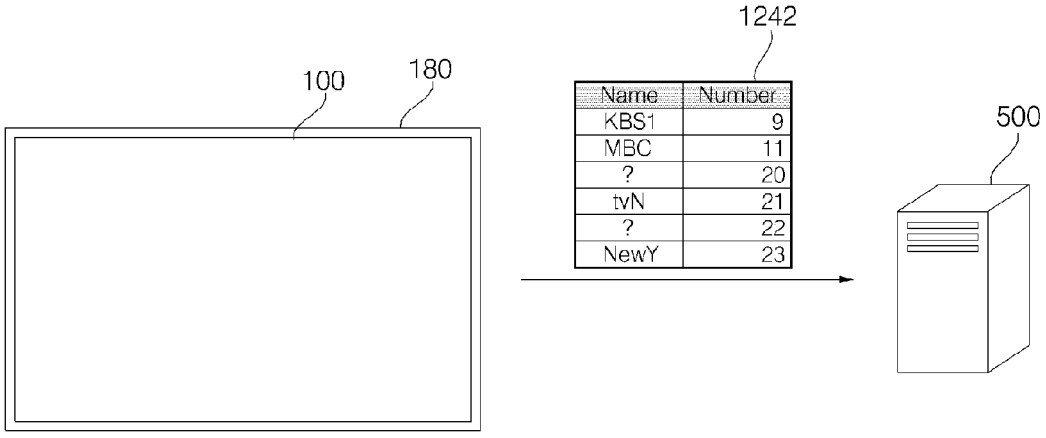


FIG. 12B



Name	Number
KBS1	9
MBC	11
?	20
tvN	21
?	22
NewY	23

FIG. 12C



Name	Number
KBS1	9
MBC	11
?	20
tvN	21
?	22
NewY	23

FIG. 12D

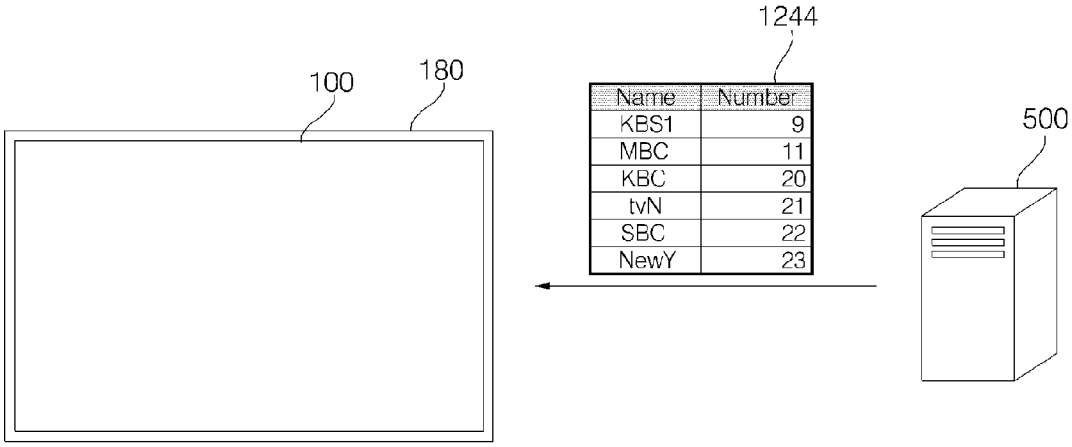


FIG. 13A

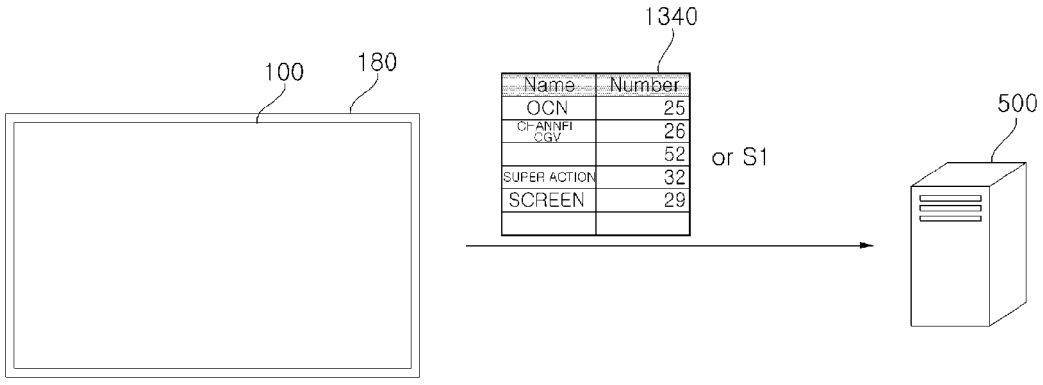


FIG. 13B

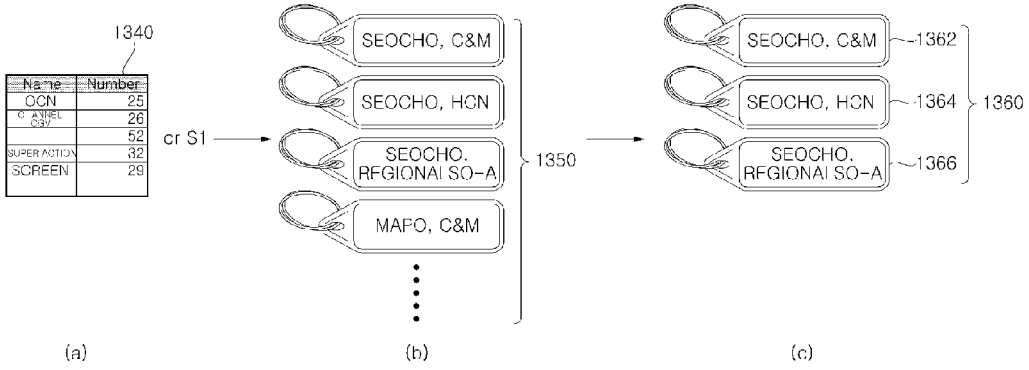


FIG. 13C

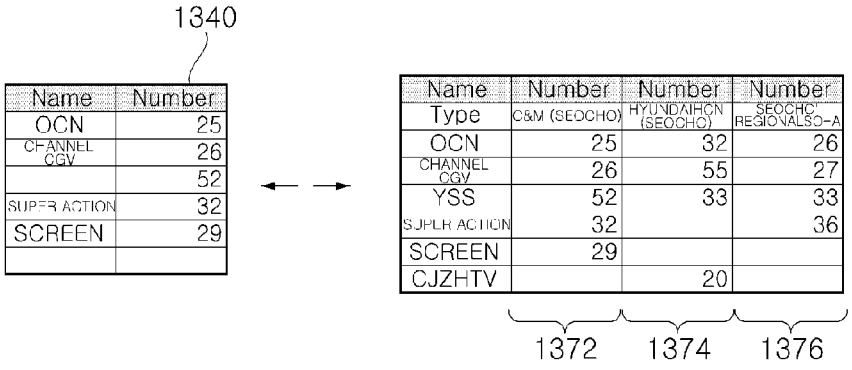


FIG. 13D

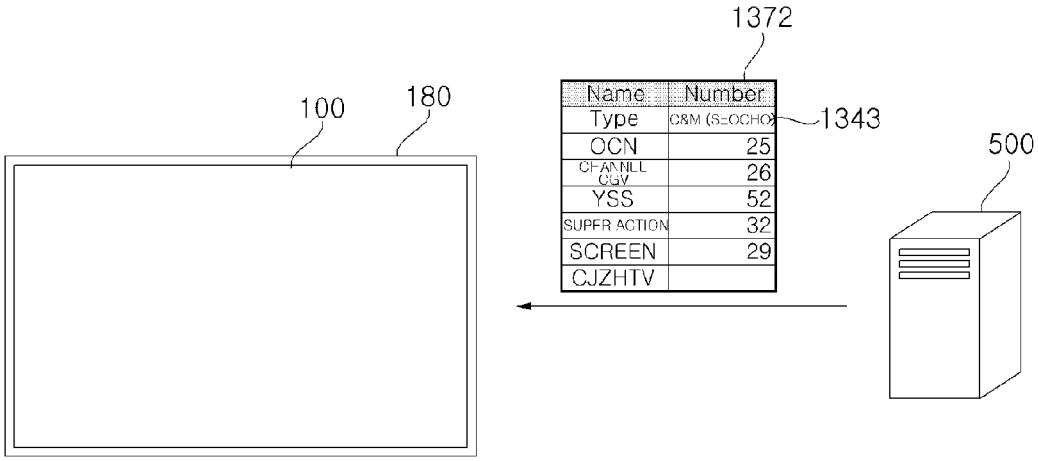


FIG. 13E

Name	Number	Number	Number
Type	ECONOMICAL	BASIC	PREMIUM
MBC GAME	607	607	607
ON GAME NET	608	608	608
BADOOK TV	621	621	621
FTV		622	622
FSTV		623	623
MOUNTAIN TV		624	624
BRAIN TV			625
LIVING TV			626

1382 1384 1386

FIG. 13F

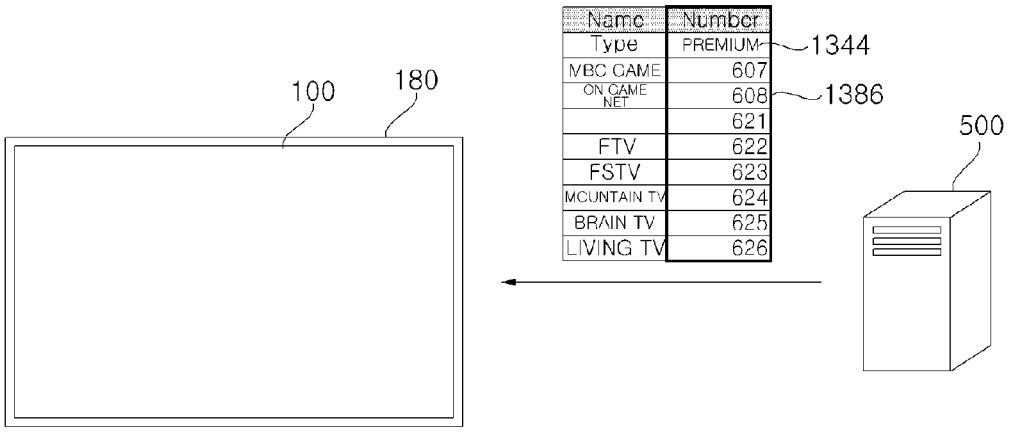

Name
Number
Type
PREMIUM
MBC GAME
607
ON GAME NET
608
621
FTV
622
FSTV
623
MOUNTAIN TV
624
BRAIN TV
625
LIVING TV
626
1344
1386
100
180
500

FIG. 14A

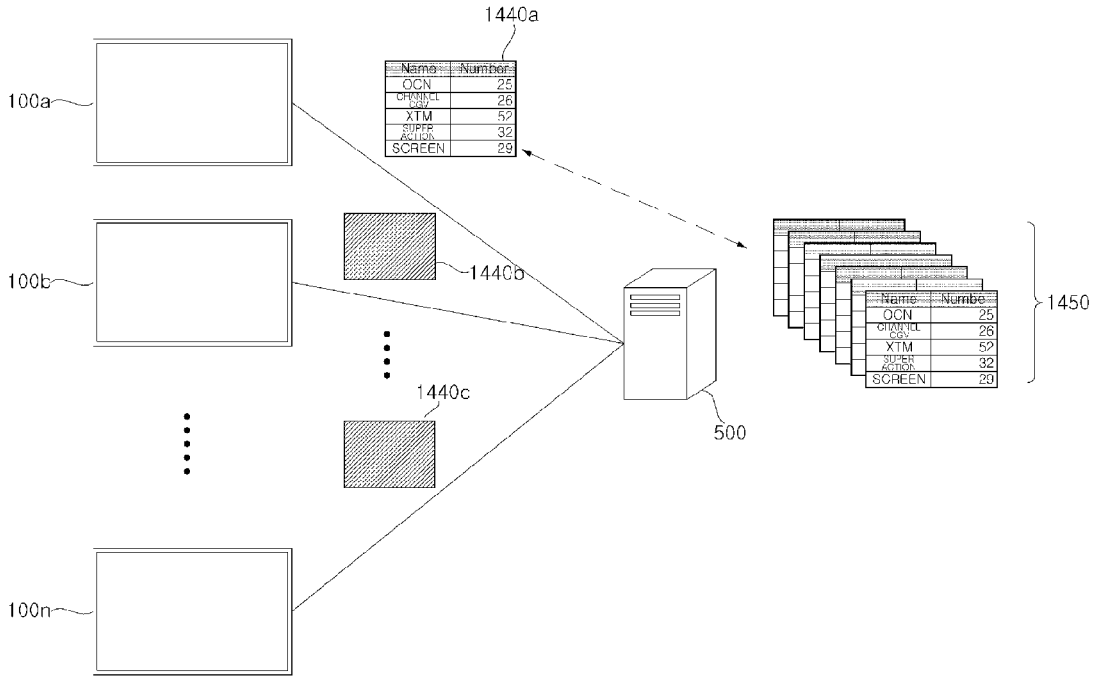

1440a
Name
Number
OCN
25
CHANNEL DAV
26
XTM
52
SUPER ACTION
32
SCREEN
29
100a
100b
1440b
1440c
500
1450
100n

FIG. 14B

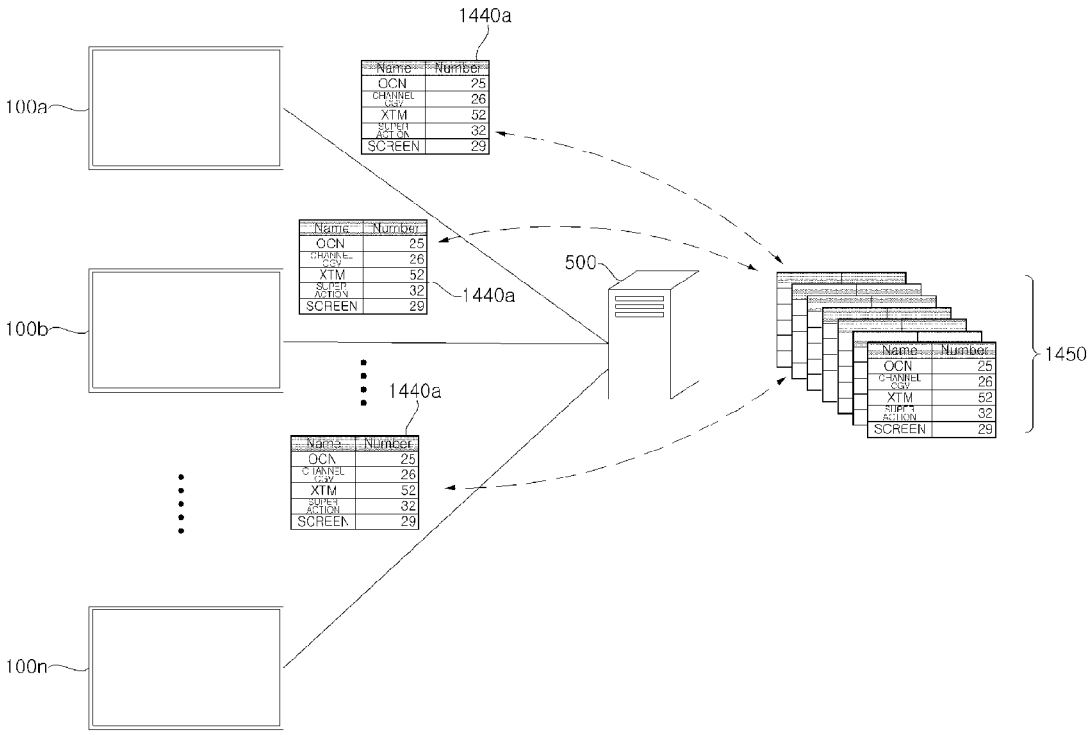

1440a
100a
Name Number
OCN 25
CHANNEL CGV 26
XTM 52
SUPER ACTION 32
SCREEN 29
100b
500
1450
100n

FIG. 14C

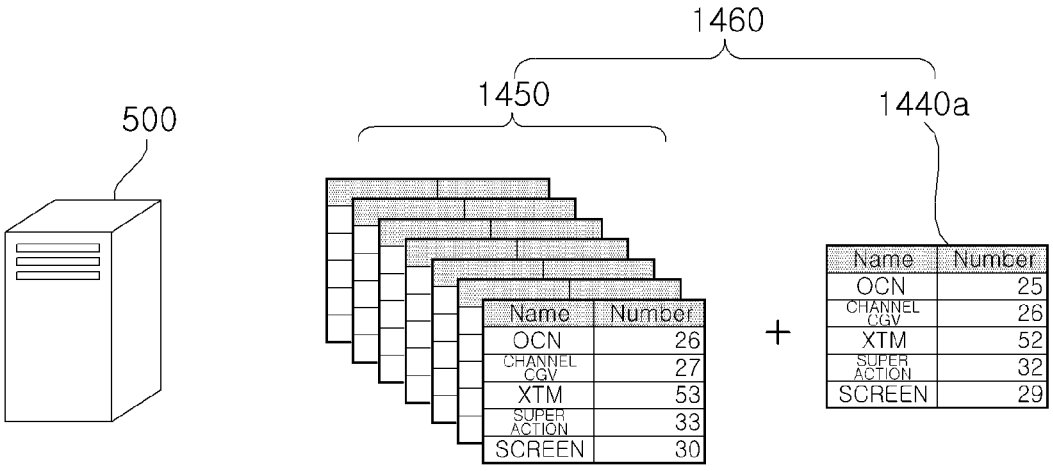

1460
1450
1440a
500
Name
Number
OCN
26
CHANNEL CGV
27
XTM
53
SUPER ACTION
33
SCREEN
30
+
Name
Number
OCN
25
CHANNEL CGV
26
XTM
52
SUPER ACTION
32
SCREEN
29

FIG. 15

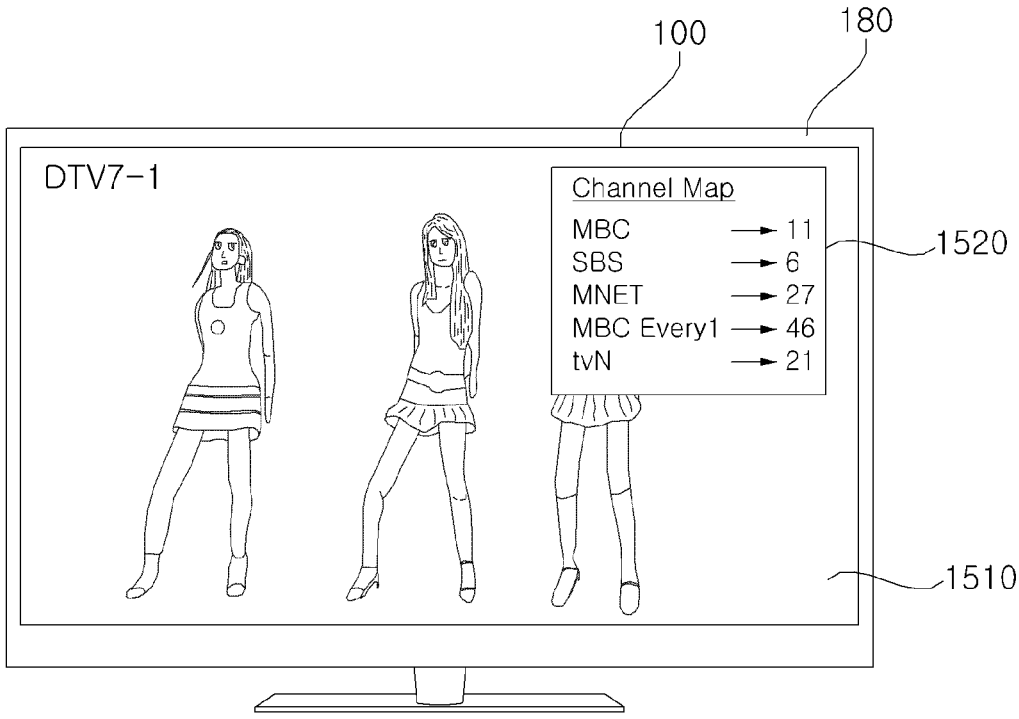

100
180
DTV7-1
Channel Map
MBC → 11
SBS → 6
MNET → 27
MBC Every1 → 46
tvN → 21
1520
1510

FIG. 16A

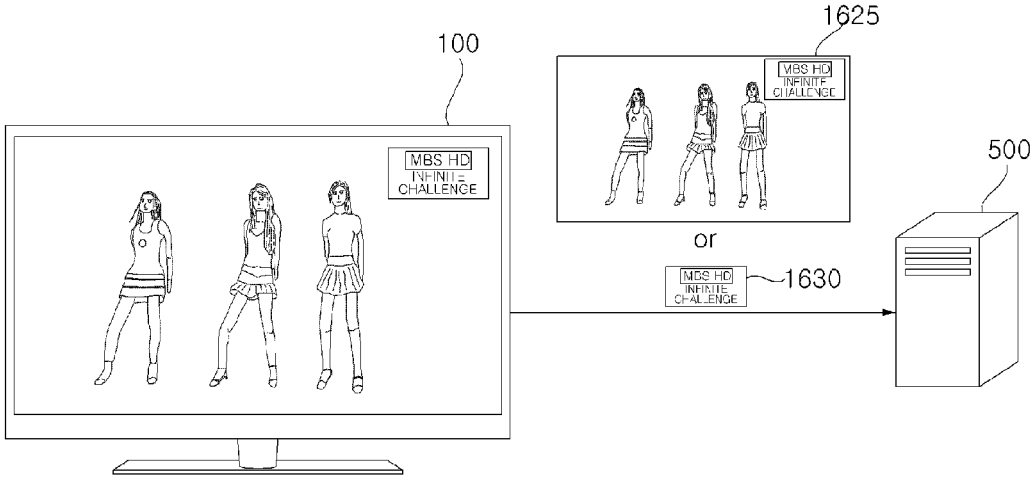

100
MBS HD
INFINITE
CHALLENGE
1625
MBS HD
INFINITE
CHALLENGE
or
MBS HD
INFINITE
CHALLENGE
1630
500

FIG. 16B

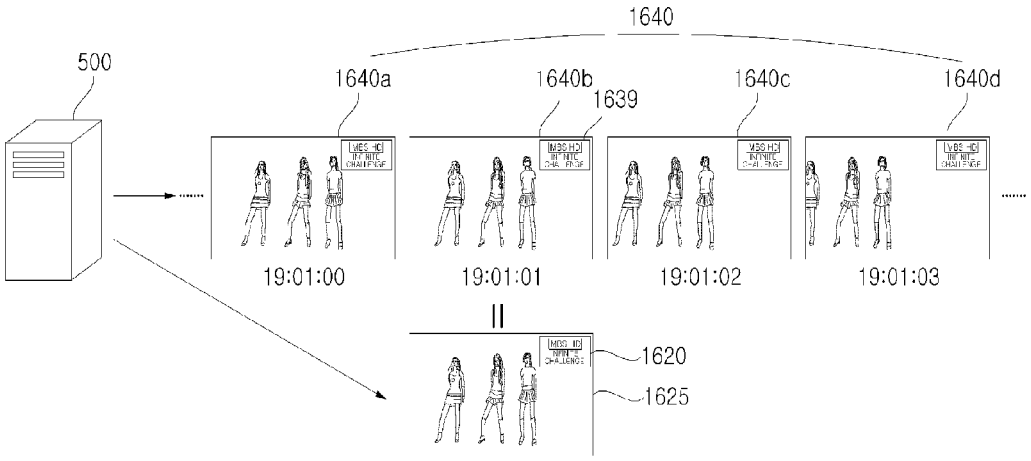

1640
500
1640a
1640b
1639
1640c
1640d
19:01:00
19:01:01
19:01:02
19:01:03
1620
1625

FIG. 16C

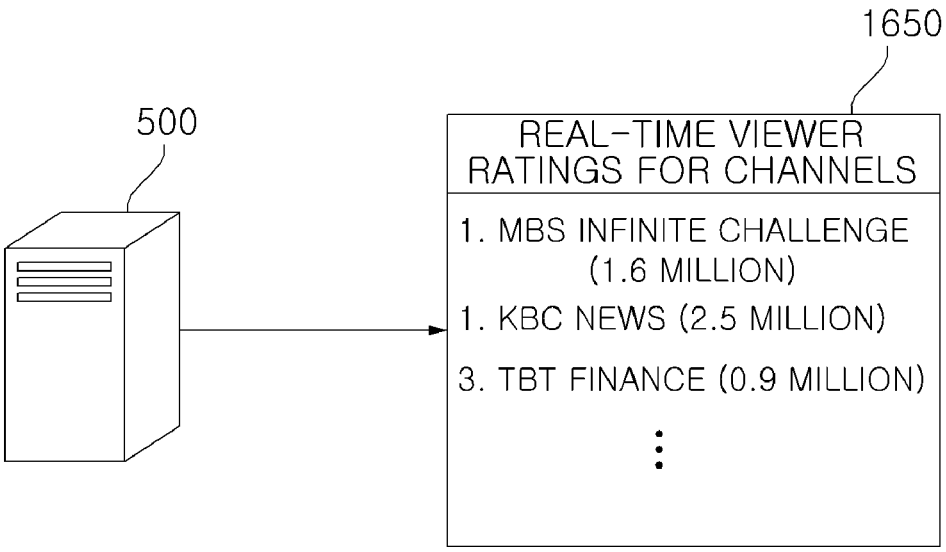

1650
500
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHALLENGE (1.6 MILLION)
1. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)

FIG. 16D

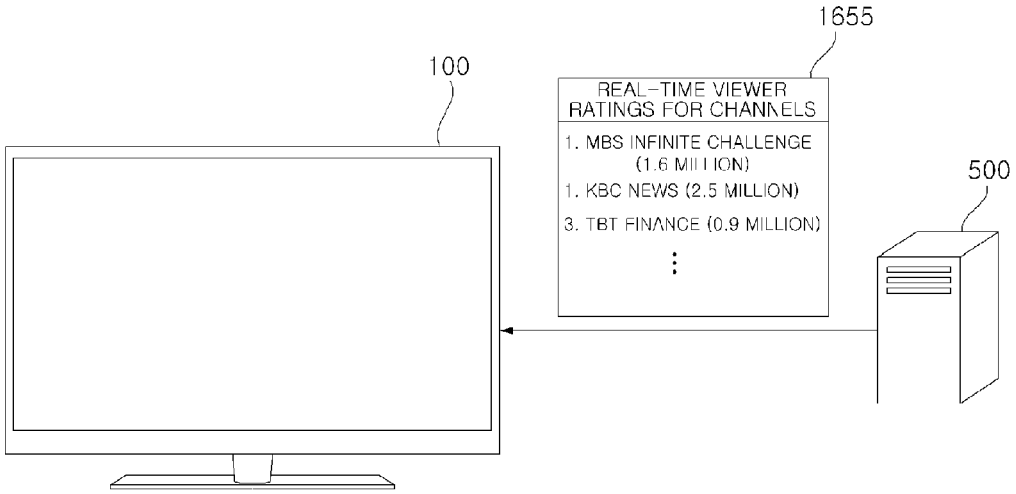

1655
100
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHALLENGE (1.6 MILLION)
1. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
500

FIG. 16E

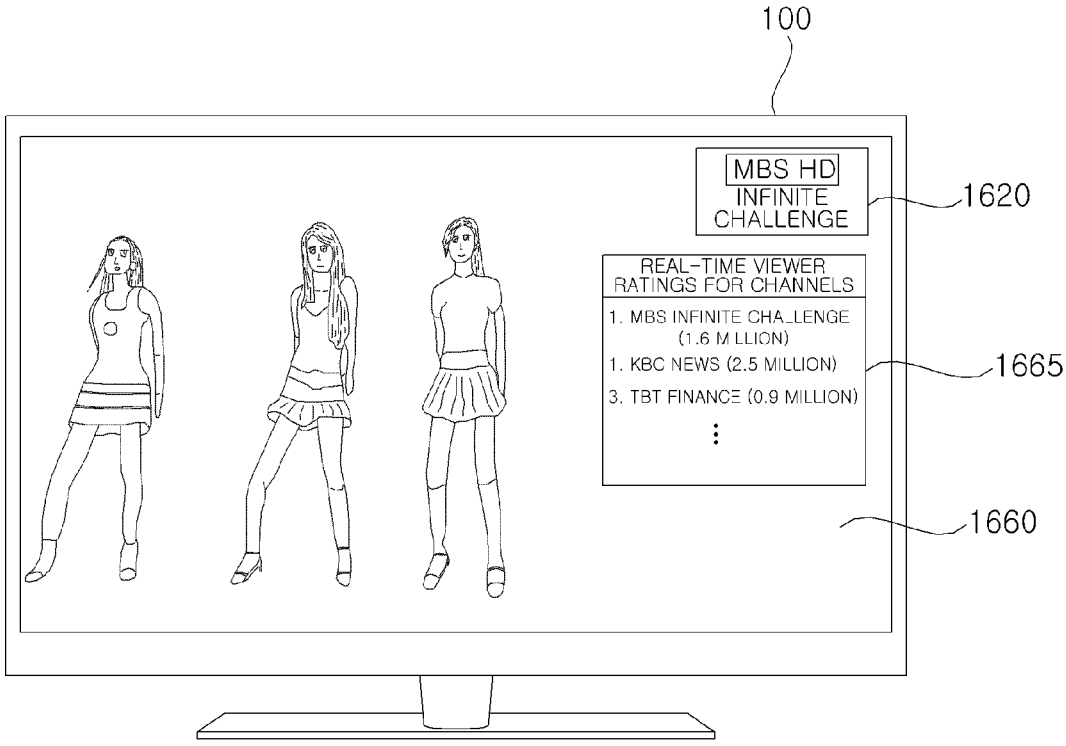

100
MBS HD
INFINITE CHALLENGE
1620
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHA_LENGE (1.6 M LLION)
1. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
1665
1660

FIG. 17

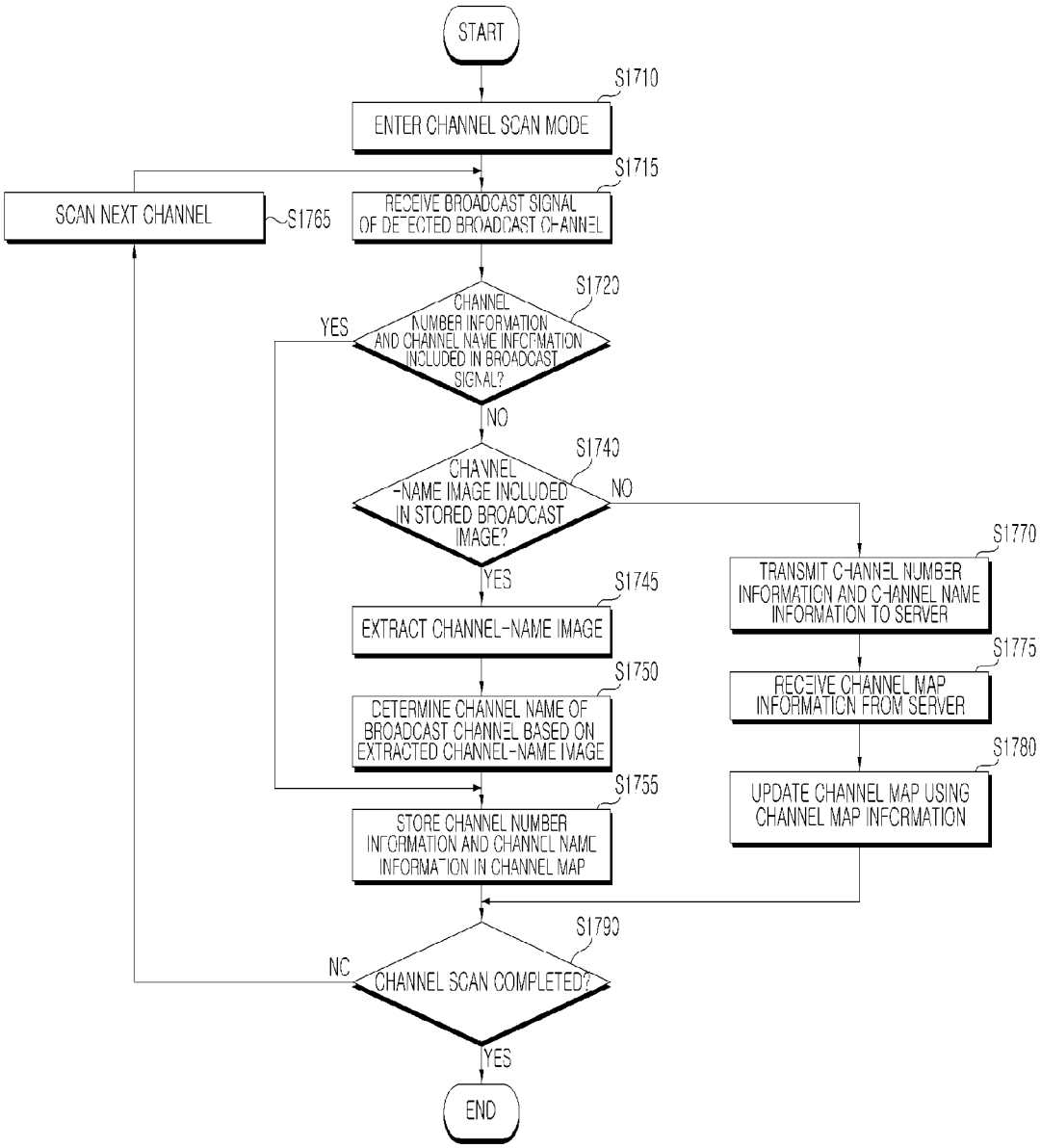

START
S1710
ENTER CHANNEL SCAN MODE
S1715
RECEIVE BROADCAST SIGNAL OF DETECTED BROADCAST CHANNEL
S1720
CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION INCLUDED IN BROADCAST SIGNAL?
YES
NO
S1740
CHANNEL -NAME IMAGE INCLUDED IN STORED BROADCAST IMAGE?
NO
YES
S1745
EXTRACT CHANNEL-NAME IMAGE
S1750
DETERMINE CHANNEL NAME OF BROADCAST CHANNEL BASED ON EXTRACTED CHANNEL-NAME IMAGE
S1755
STORE CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION IN CHANNEL MAP
S1765
SCAN NEXT CHANNEL
S1770
TRANSMIT CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION TO SERVER
S1775
RECEIVE CHANNEL MAP INFORMATION FROM SERVER
S1780
UPDATE CHANNEL MAP USING CHANNEL MAP INFORMATION
S1790
CHANNEL SCAN COMPLETED?
NO
YES
END

FIG. 18

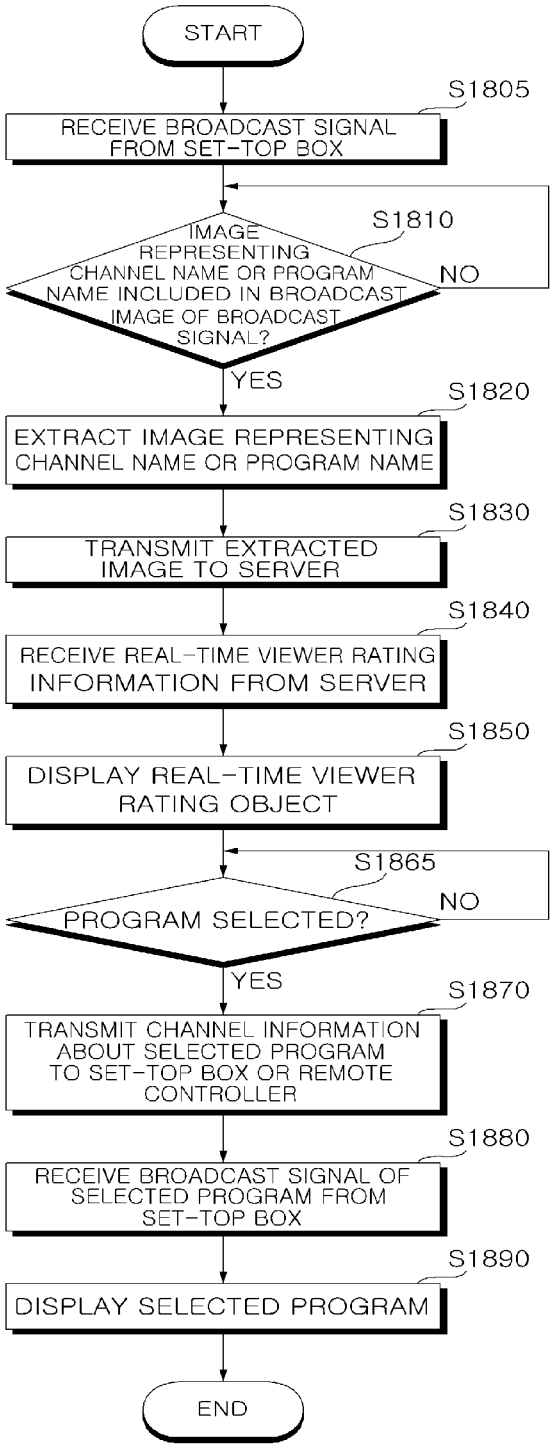

START
S1805
RECEIVE BROADCAST SIGNAL FROM SET-TOP BOX
S1810
IMAGE REPRESENTING CHANNEL NAME OR PROGRAM NAME INCLUDED IN BROADCAST IMAGE OF BROADCAST SIGNAL?
NO
YES
S1820
EXTRACT IMAGE REPRESENTING CHANNEL NAME OR PROGRAM NAME
S1830
TRANSMIT EXTRACTED IMAGE TO SERVER
S1840
RECEIVE REAL-TIME VIEWER RATING INFORMATION FROM SERVER
S1850
DISPLAY REAL-TIME VIEWER RATING OBJECT
S1865
PROGRAM SELECTED?
NO
YES
S1870
TRANSMIT CHANNEL INFORMATION ABOUT SELECTED PROGRAM TO SET-TOP BOX OR REMOTE CONTROLLER
S1880
RECEIVE BROADCAST SIGNAL OF SELECTED PROGRAM FROM SET-TOP BOX
S1890
DISPLAY SELECTED PROGRAM
END

FIG. 19

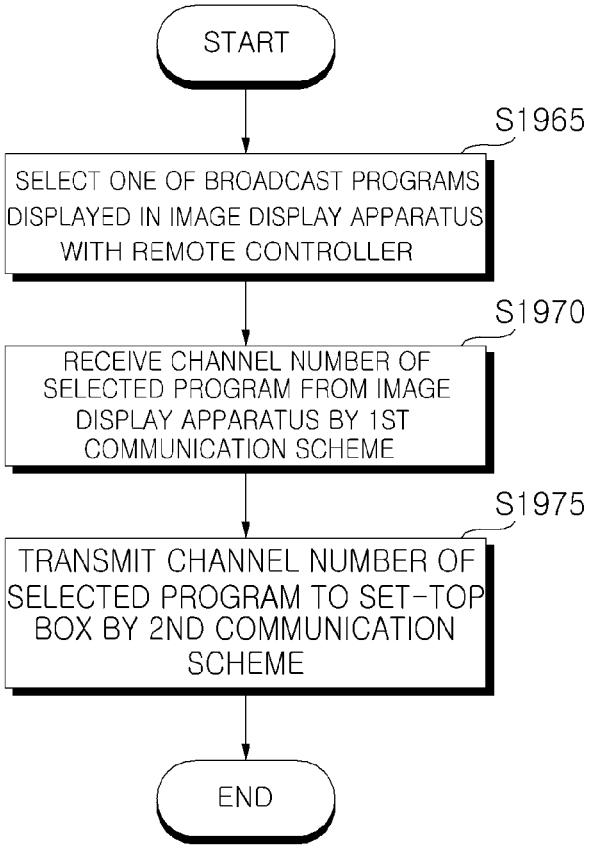

START
S1965
SELECT ONE OF BROADCAST PROGRAMS DISPLAYED IN IMAGE DISPLAY APPARATUS WITH REMOTE CONTROLLER
S1970
RECEIVE CHANNEL NUMBER OF SELECTED PROGRAM FROM IMAGE DISPLAY APPARATUS BY 1ST COMMUNICATION SCHEME
S1975
TRANSMIT CHANNEL NUMBER OF SELECTED PROGRAM TO SET-TOP BOX BY 2ND COMMUNICATION SCHEME
END

FIG. 20

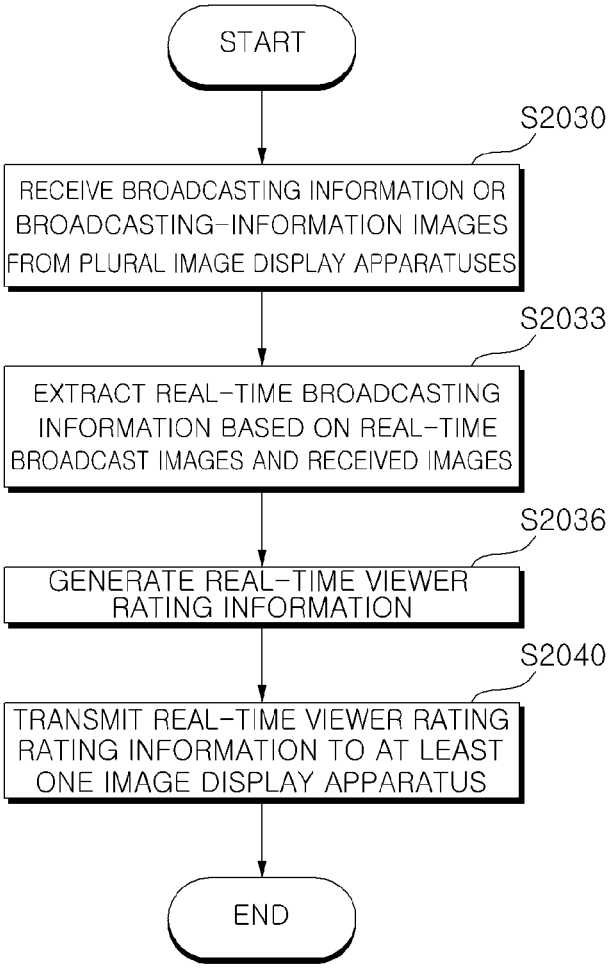

START
S2030
RECEIVE BROADCASTING INFORMATION OR BROADCASTING-INFORMATION IMAGES FROM PLURAL IMAGE DISPLAY APPARATUSES
S2033
EXTRACT REAL-TIME BROADCASTING INFORMATION BASED ON REAL-TIME BROADCAST IMAGES AND RECEIVED IMAGES
S2036
GENERATE REAL-TIME VIEWER RATING INFORMATION
S2040
TRANSMIT REAL-TIME VIEWER RATING RATING INFORMATION TO AT LEAST ONE IMAGE DISPLAY APPARATUS
END

FIG. 21

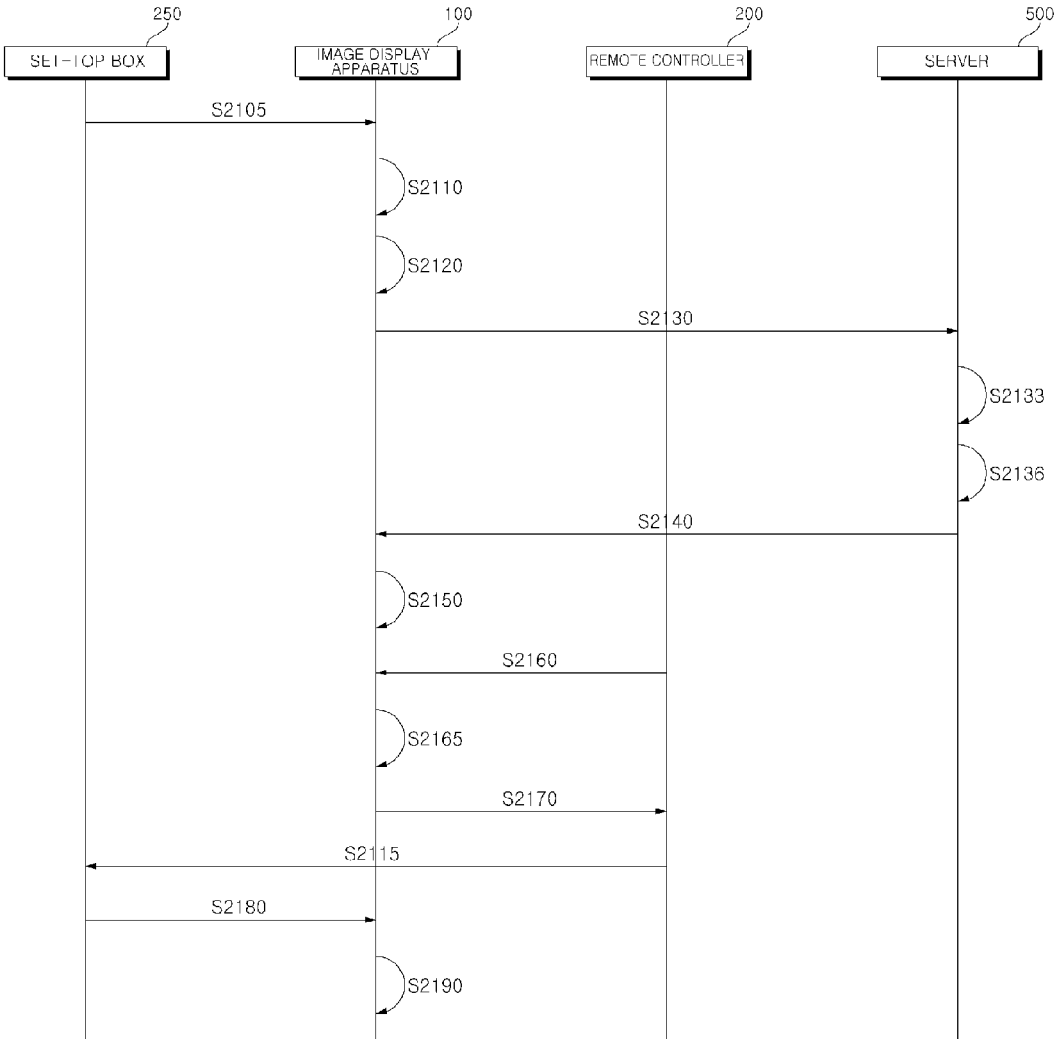

250
SET-TOP BOX
100
IMAGE DISPLAY APPARATUS
200
REMOTE CONTROLLER
500
SERVER
S2105
S2110
S2120
S2130
S2133
S2136
S2140
S2150
S2160
S2165
S2170
S2115
S2180
S2190

FIG. 22

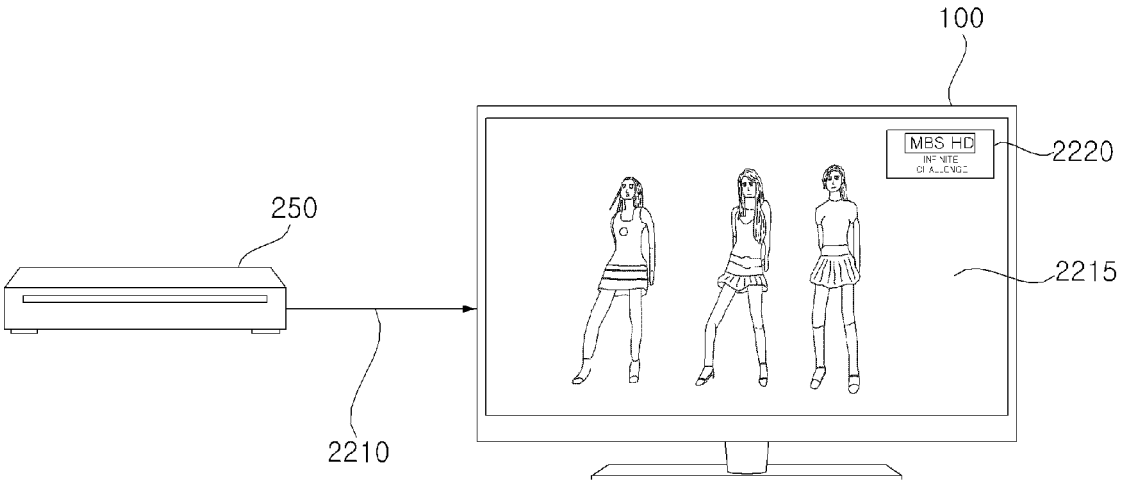


FIG. 23A

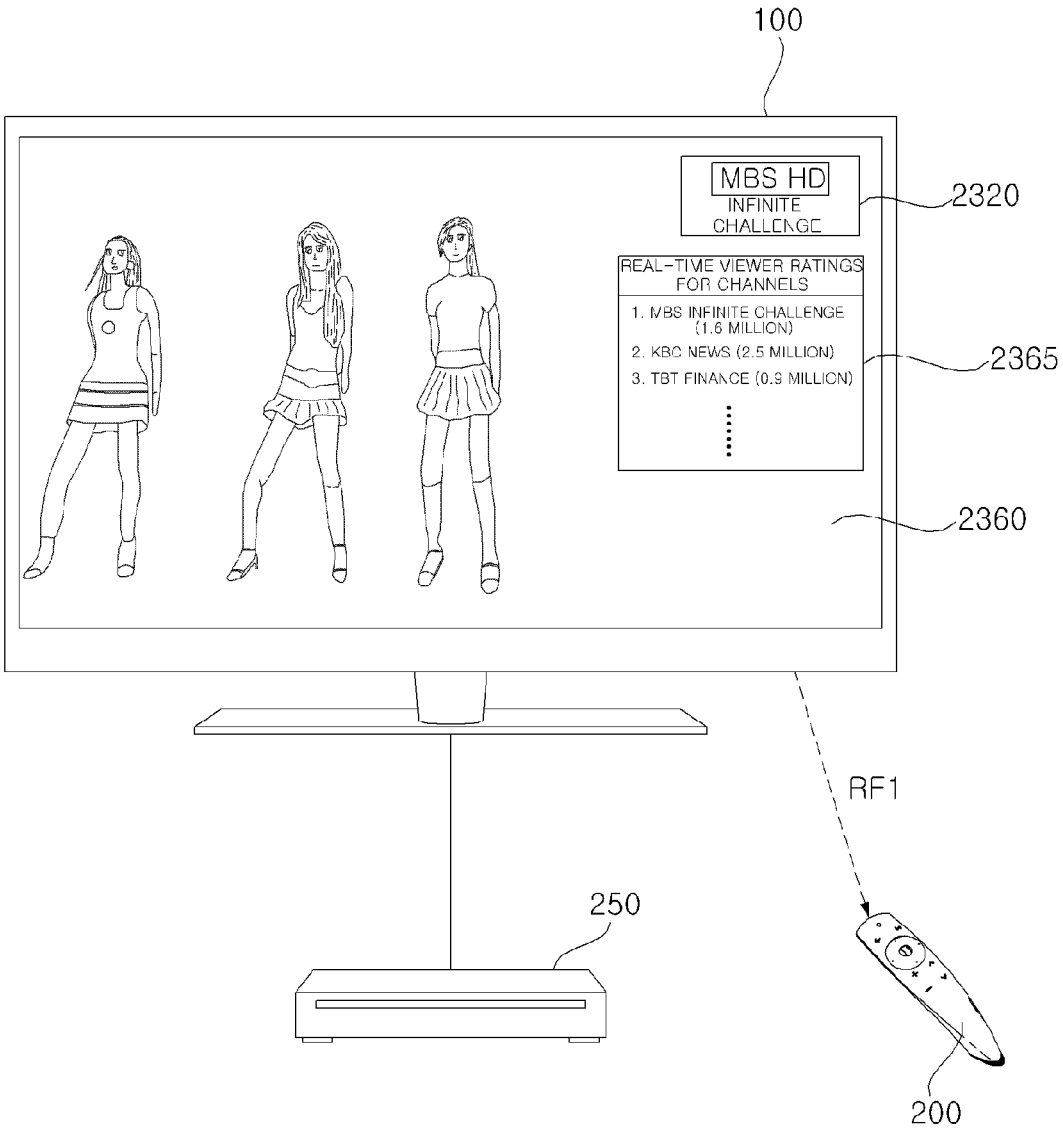

100
MBS HD
INFINITE CHALLENGE
2320
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHALLENGE (1.6 MILLION)
2. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
2365
2360
RF1
250
200

FIG. 23B

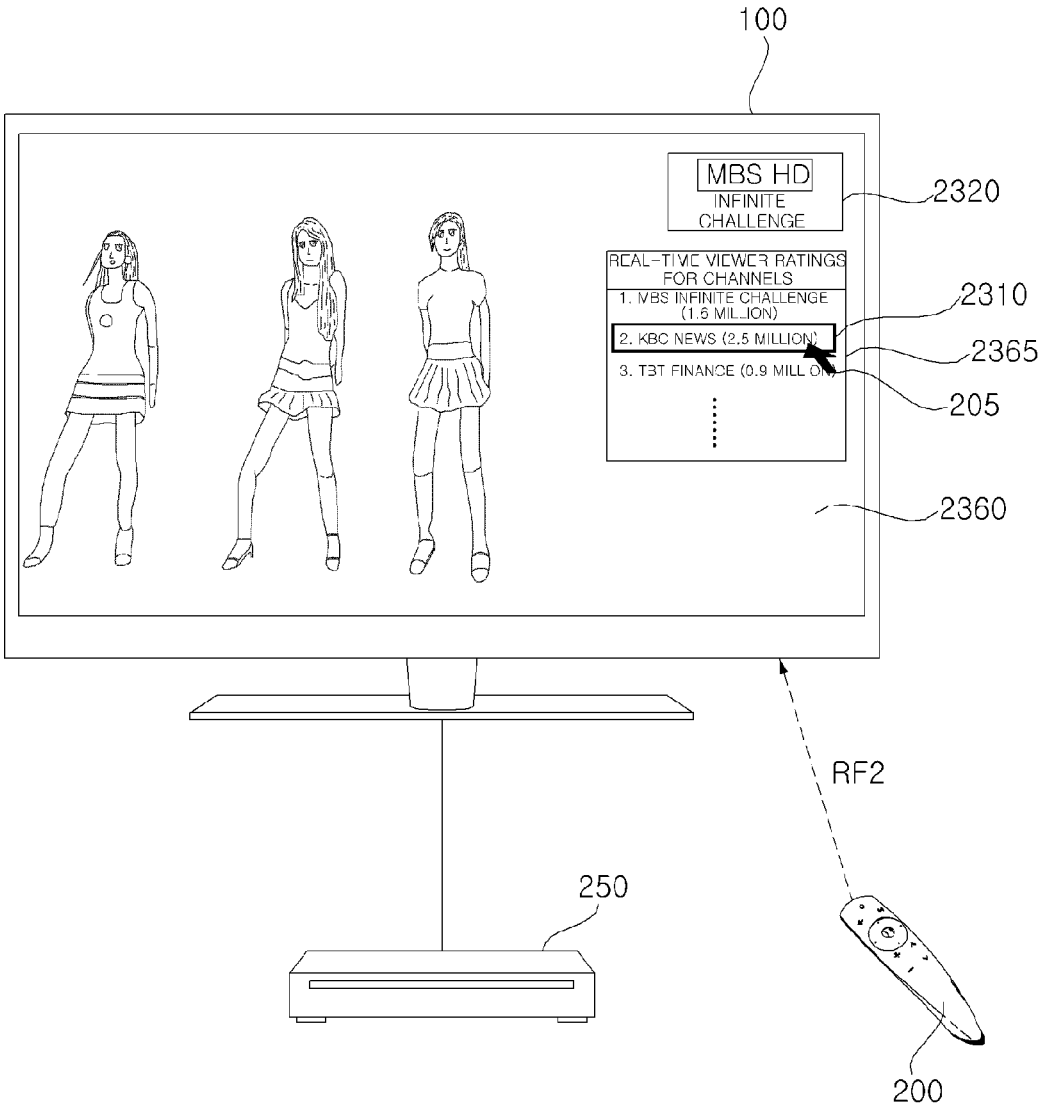

100
MBS HD
INFINITE CHALLENGE
2320
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHALLENGE (1.6 MILLION)
2. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
2310
2365
205
2360
RF2
250
200

FIG. 23C

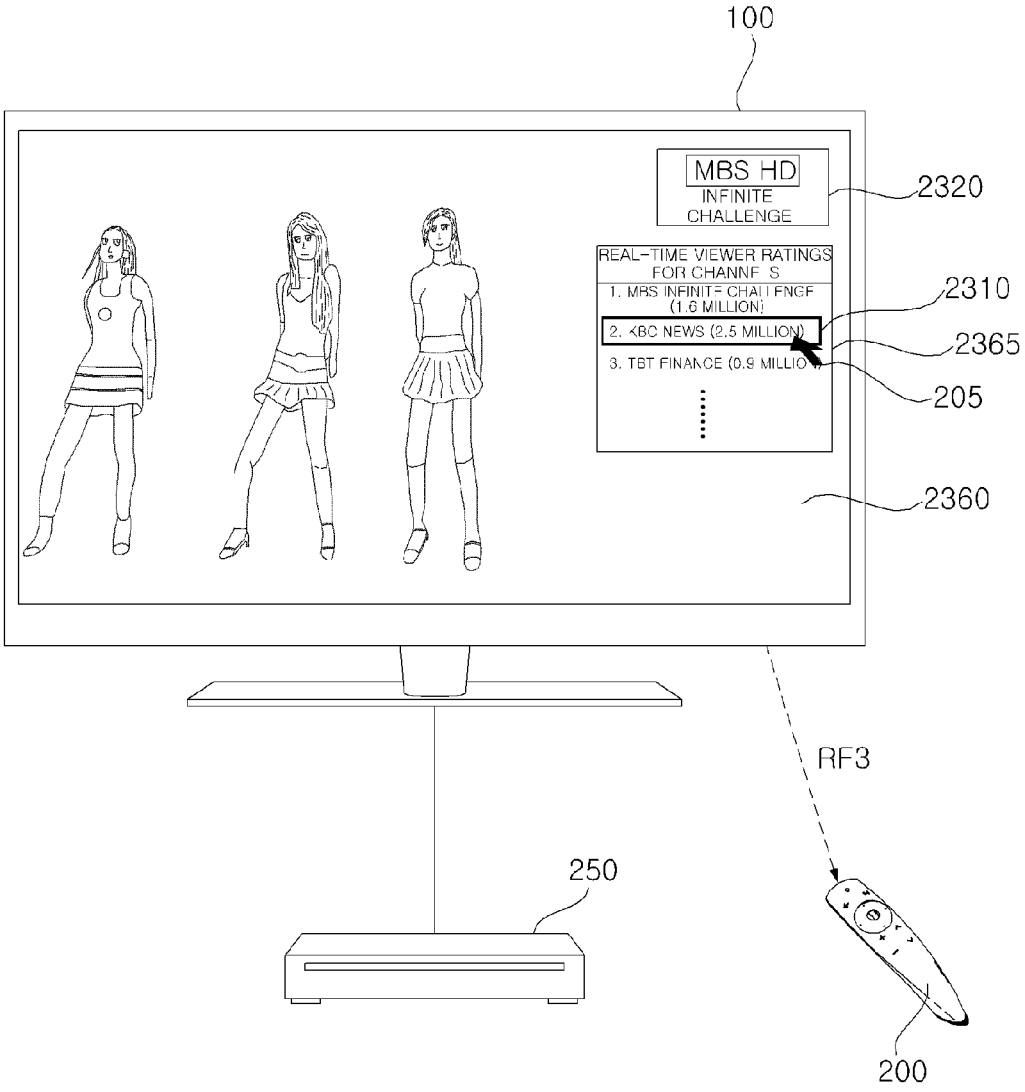

100
MBS HD
INFINITE
CHALLENGE
2320
REAL-TIME VIEWER RATINGS
FOR CHANNEL S
1. MBS INFINITE CHALLENGE
(1.6 MILLION)
2. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
2310
2365
205
2360
RF3
250
200

FIG. 23D

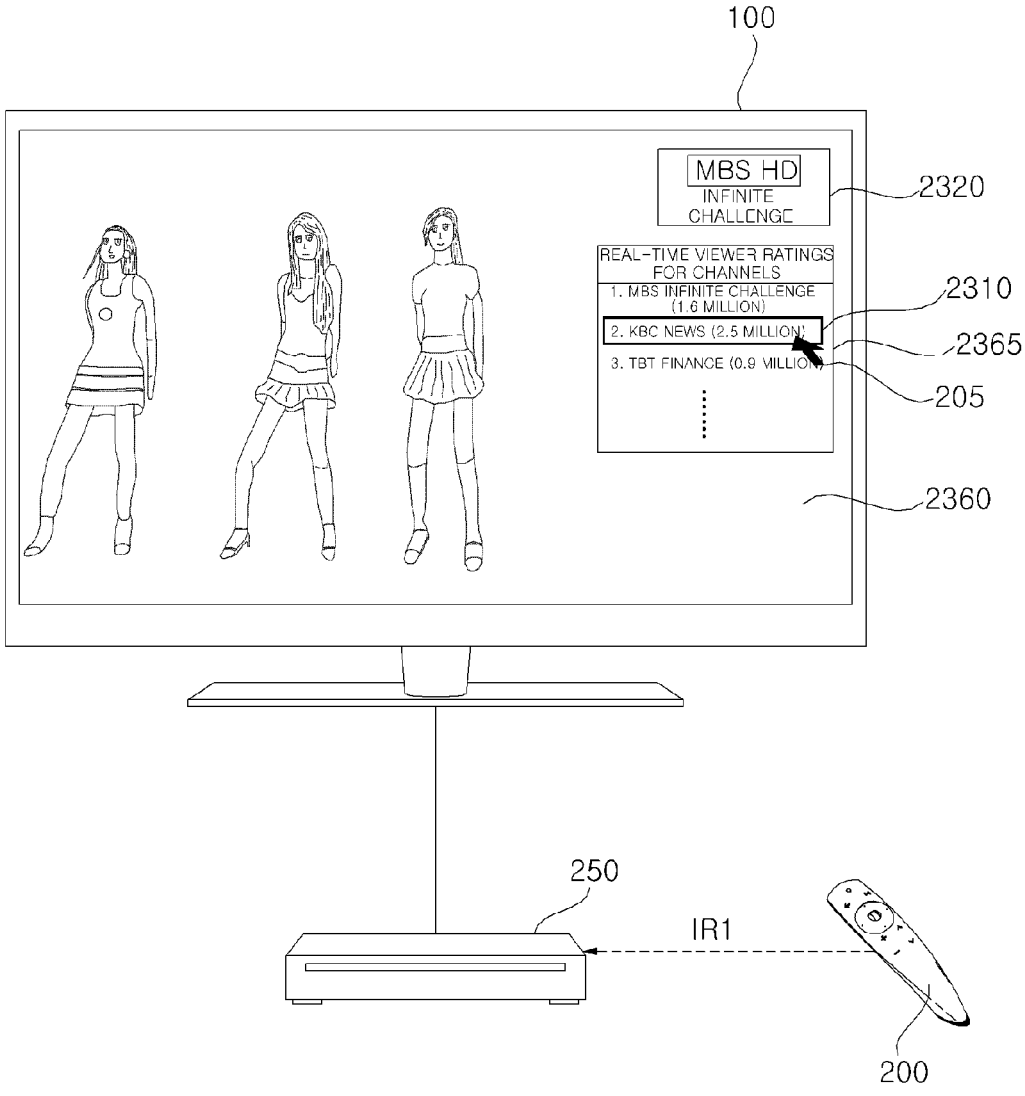

100
MBS HD
INFINITE CHALLENGE
2320
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHALLENGE (1.6 MILLION)
2. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
2310
2365
205
2360
250
IR1
200

FIG. 23E

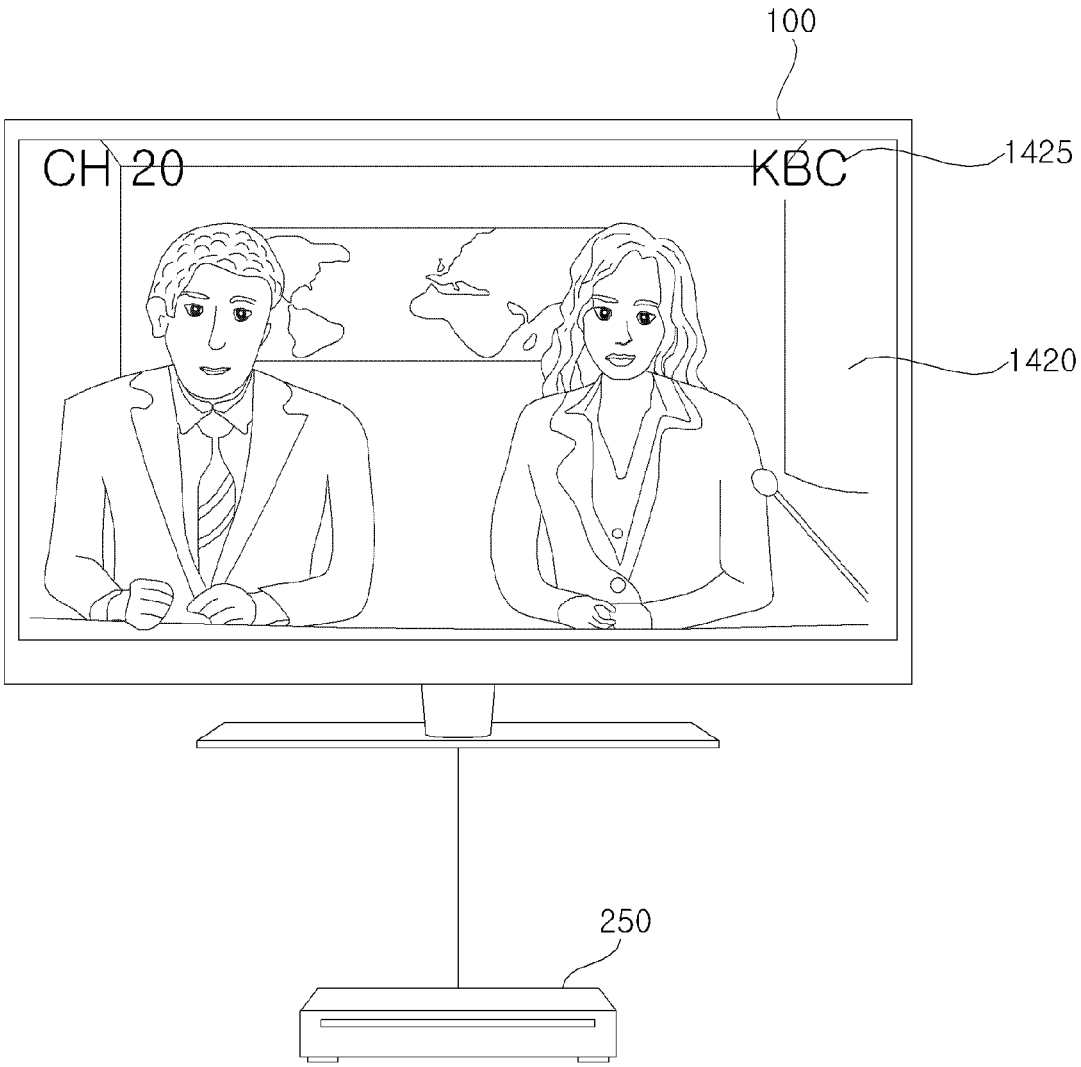


FIG. 24

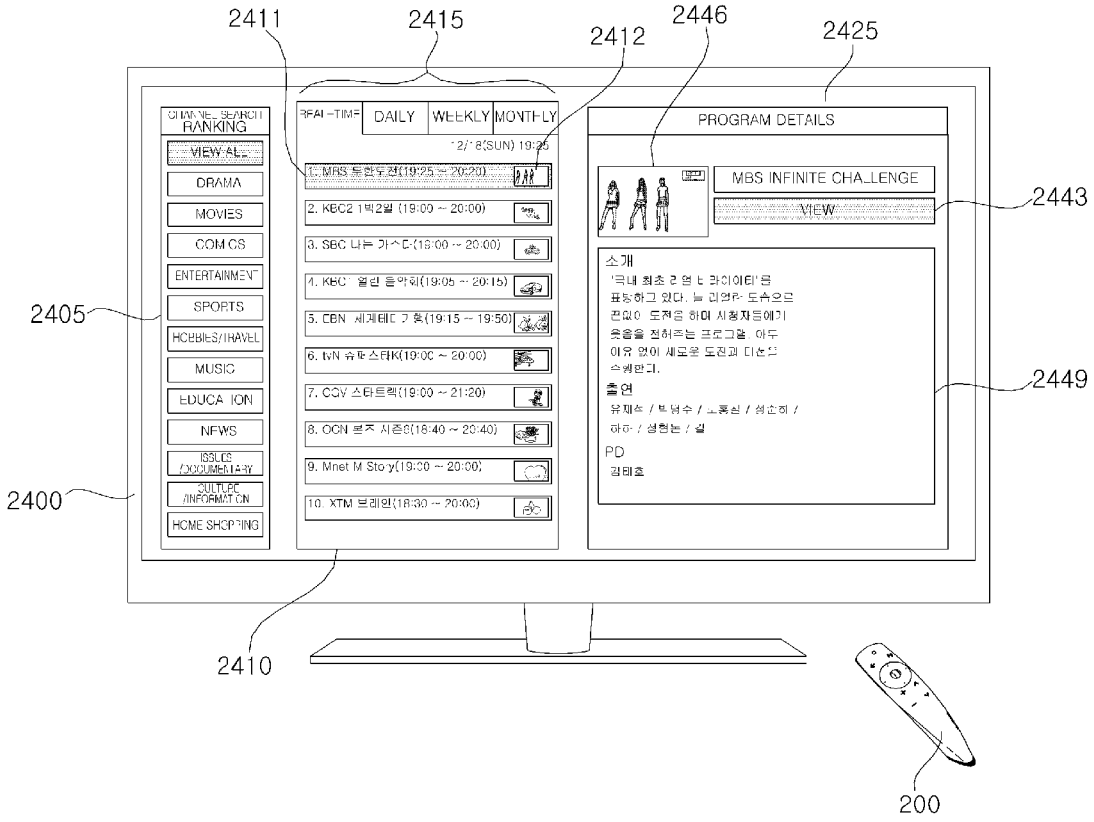

2411
2415
2412
2446
2425
CHANNEL SEARCH
RANKING
VIEW ALL
DRAMA
MOVIES
COMICS
ENTERTAINMENT
SPORTS
HOBBIES/TRAVEL
MUSIC
EDUCATION
NEWS
ISSUES /DOCUMENTARY
CULTURE /INFORMATION
HOME SHOPPING
REAL-TIME
DAILY
WEEKLY
MONTHLY
2/8(SUN) 19:25
1. MBC 동안우정(19:25 ~ 20:20)
2. KBC2 1박2일 (19:00 ~ 20:00)
3. SBC 나는 가수다(19:00 ~ 20:00)
4. KBC 열린 음악회(19:05 ~ 20:15)
5. CBN 세계테마 기행(19:15 ~ 19:50)
6. tvN 슈퍼스타K(19:00 ~ 20:00)
7. CQV 스타트랙(19:00 ~ 21:20)
8. OCN 로즈 시즌8(18:40 ~ 20:40)
9. Mnet M Story(19:00 ~ 20:00)
10. XTM 브레인(18:30 ~ 20:00)
PROGRAM DETAILS
MBS INFINITE CHALLENGE
VIEW
2443
소개
'극내 최초 2열 L 라이더'를
표방하고 있다. 늘 리얼R 도속으로
끈임이 도전을 하며 시청자들에게
웃음을 전하주는 프로그램. 아두
이유 없이 새로운 도전과 다소드
스펙탄그.
출연
유재석 / 박명수 / 노홍철 / 정준하 /
하하 / 정형돈 / 길
PD
김태호
2449
2405
2400
2410
200

FIG. 25

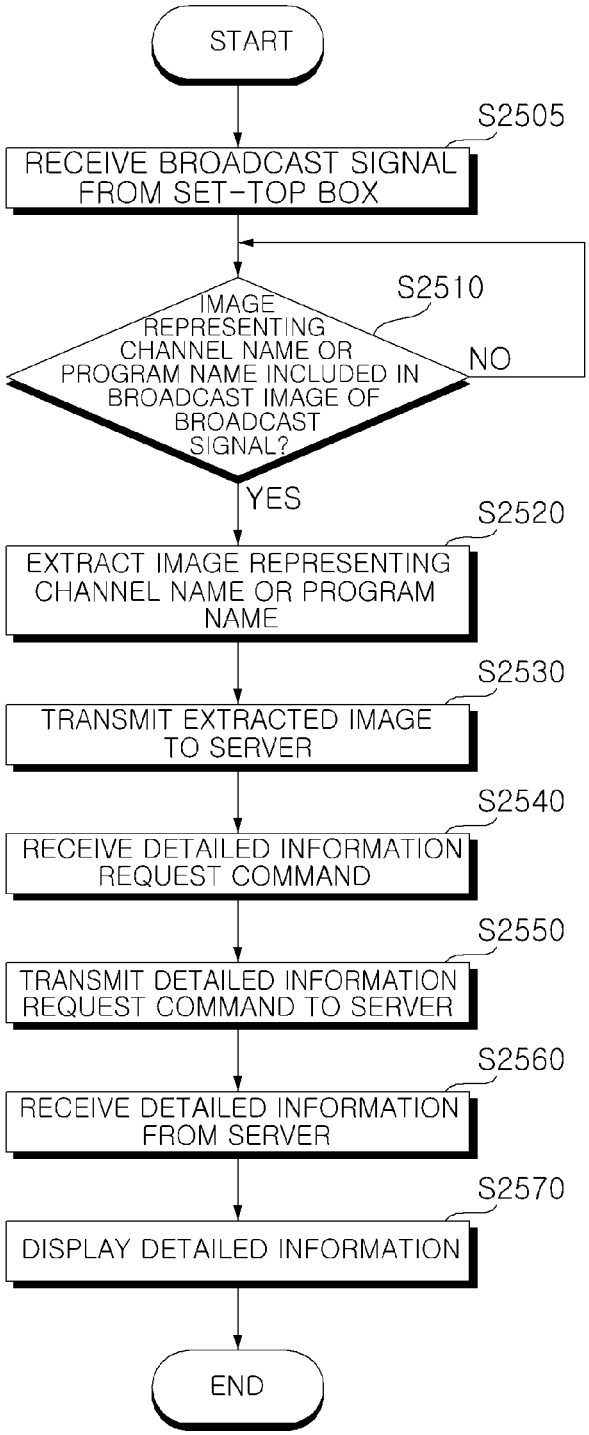

START
S2505
RECEIVE BROADCAST SIGNAL FROM SET-TOP BOX
S2510
IMAGE REPRESENTING CHANNEL NAME OR PROGRAM NAME INCLUDED IN BROADCAST IMAGE OF BROADCAST SIGNAL?
NO
YES
S2520
EXTRACT IMAGE REPRESENTING CHANNEL NAME OR PROGRAM NAME
S2530
TRANSMIT EXTRACTED IMAGE TO SERVER
S2540
RECEIVE DETAILED INFORMATION REQUEST COMMAND
S2550
TRANSMIT DETAILED INFORMATION REQUEST COMMAND TO SERVER
S2560
RECEIVE DETAILED INFORMATION FROM SERVER
S2570
DISPLAY DETAILED INFORMATION
END

FIG. 26

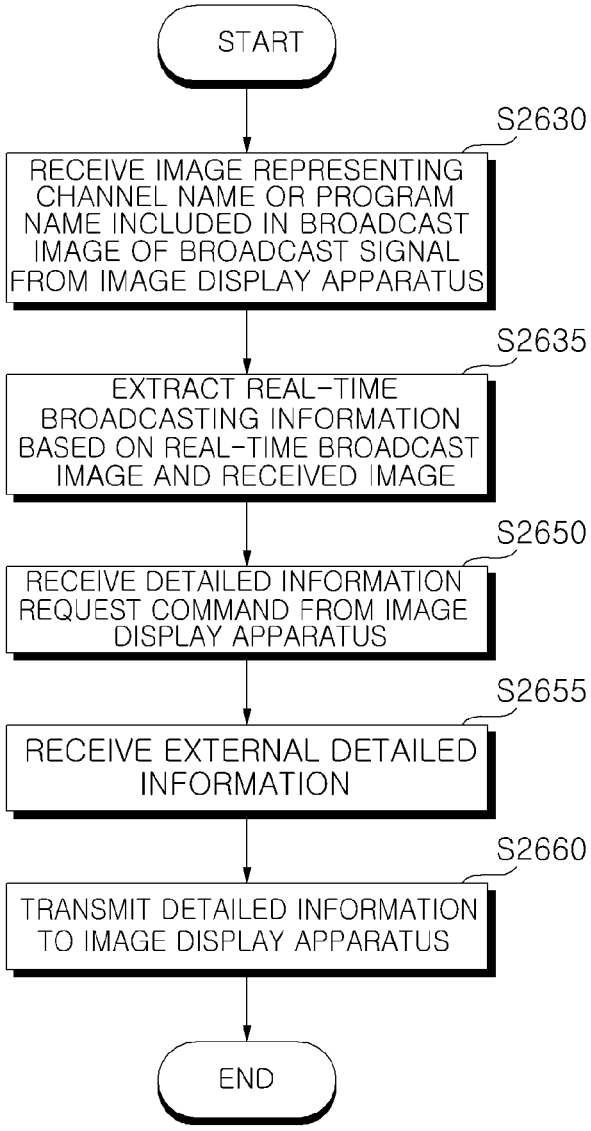

START
S2630
RECEIVE IMAGE REPRESENTING CHANNEL NAME OR PROGRAM NAME INCLUDED IN BROADCAST IMAGE OF BROADCAST SIGNAL FROM IMAGE DISPLAY APPARATUS
S2635
EXTRACT REAL-TIME BROADCASTING INFORMATION BASED ON REAL-TIME BROADCAST IMAGE AND RECEIVED IMAGE
S2650
RECEIVE DETAILED INFORMATION REQUEST COMMAND FROM IMAGE DISPLAY APPARATUS
S2655
RECEIVE EXTERNAL DETAILED INFORMATION
S2660
TRANSMIT DETAILED INFORMATION TO IMAGE DISPLAY APPARATUS
END

FIG. 27

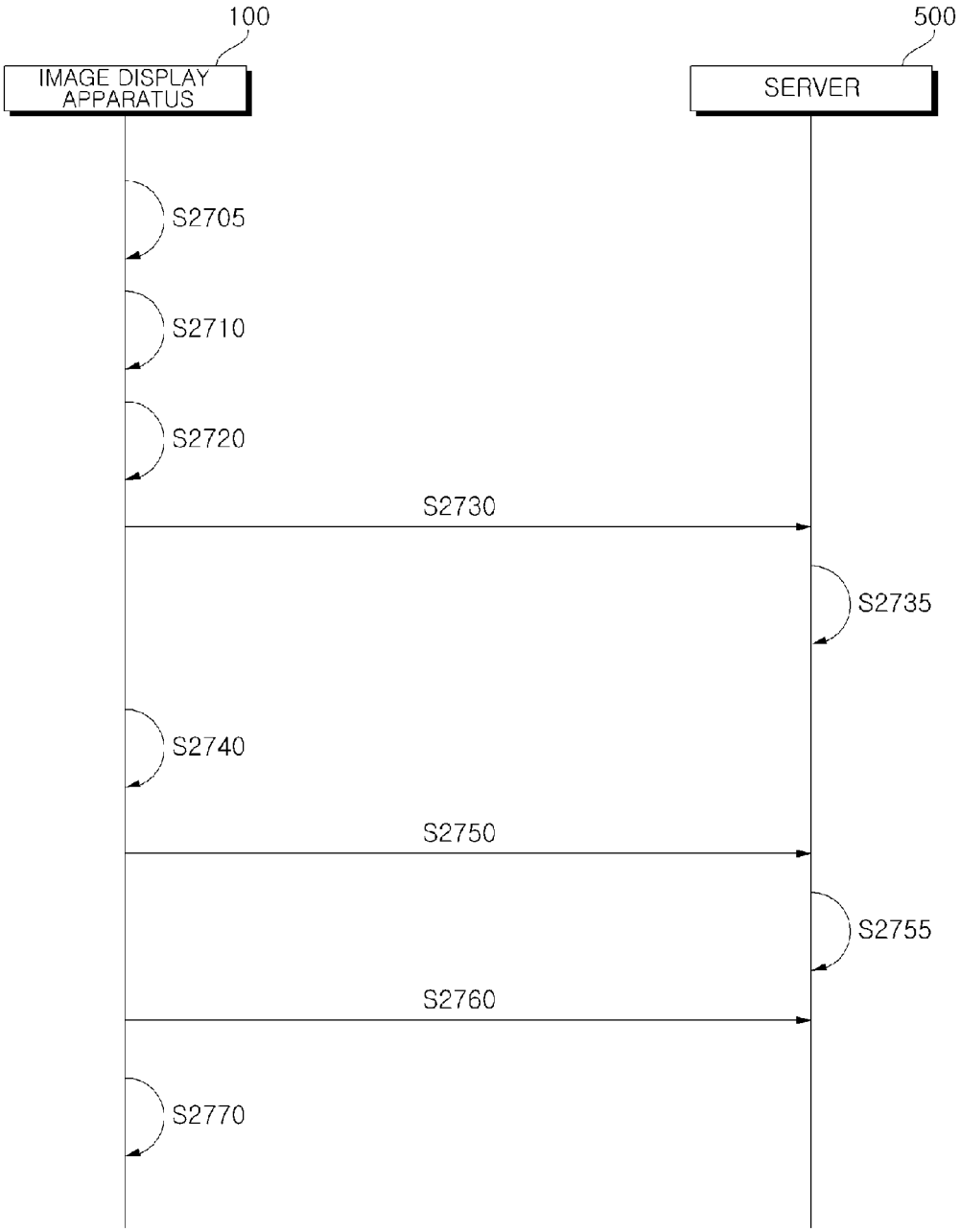

100
IMAGE DISPLAY APPARATUS
500
SERVER
S2705
S2710
S2720
S2730
S2735
S2740
S2750
S2755
S2760
S2770

FIG. 28A

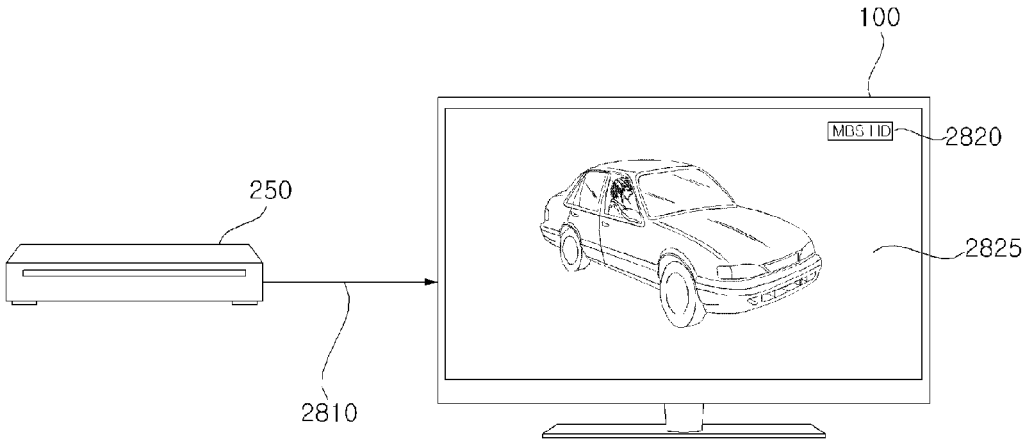


FIG. 28B

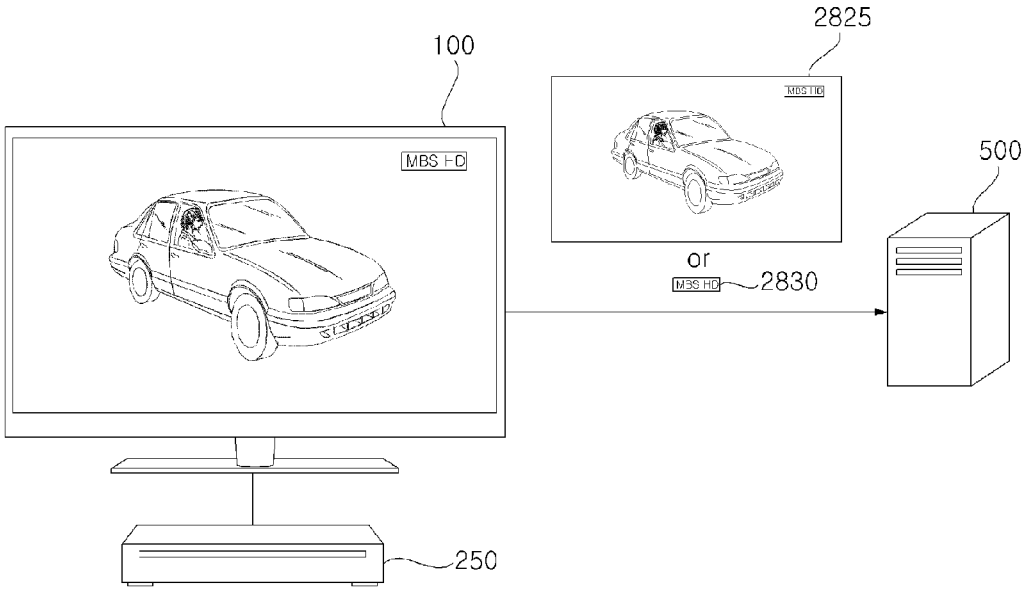


FIG. 28C

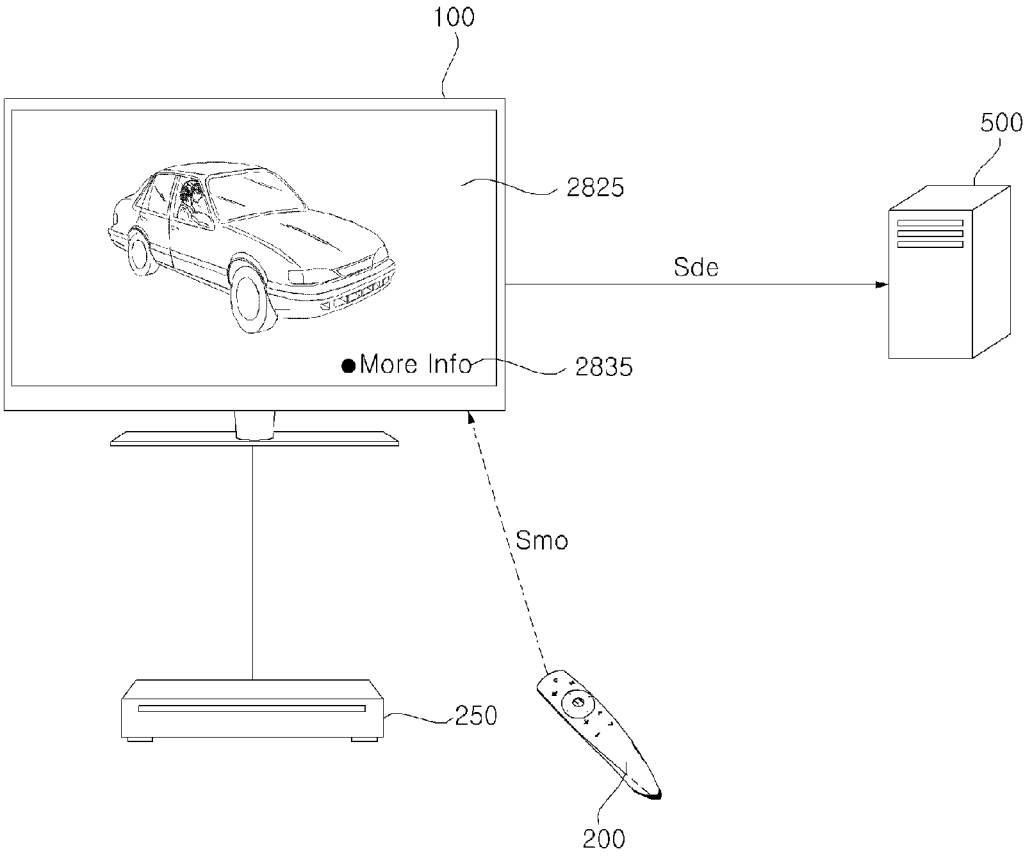


FIG. 28D

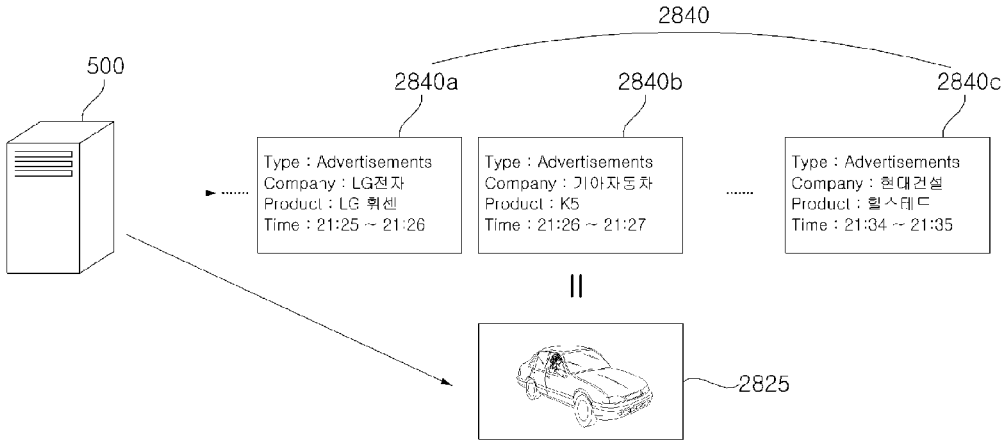


FIG. 28E

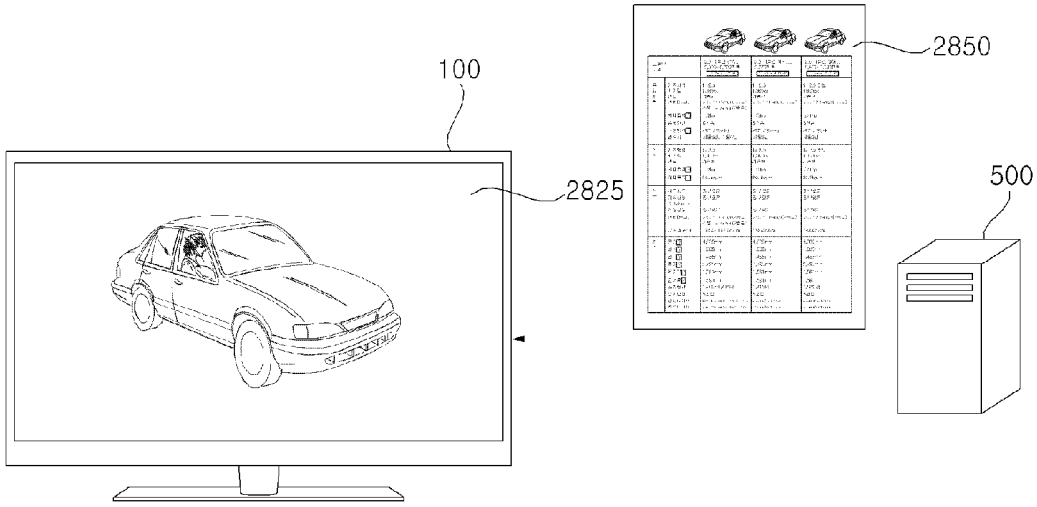


FIG. 28F

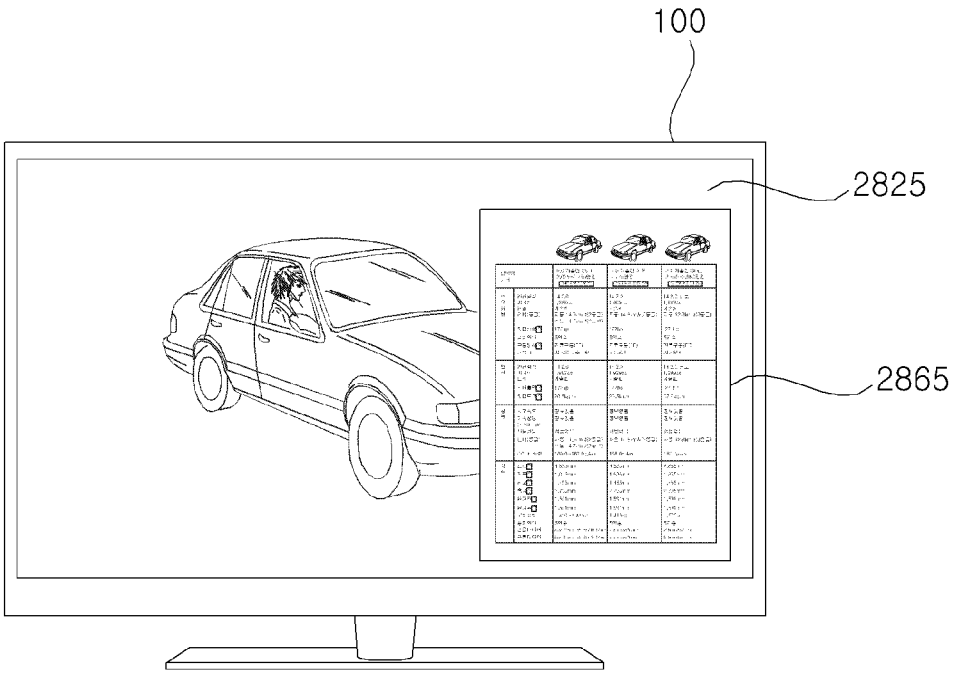


FIG. 28G

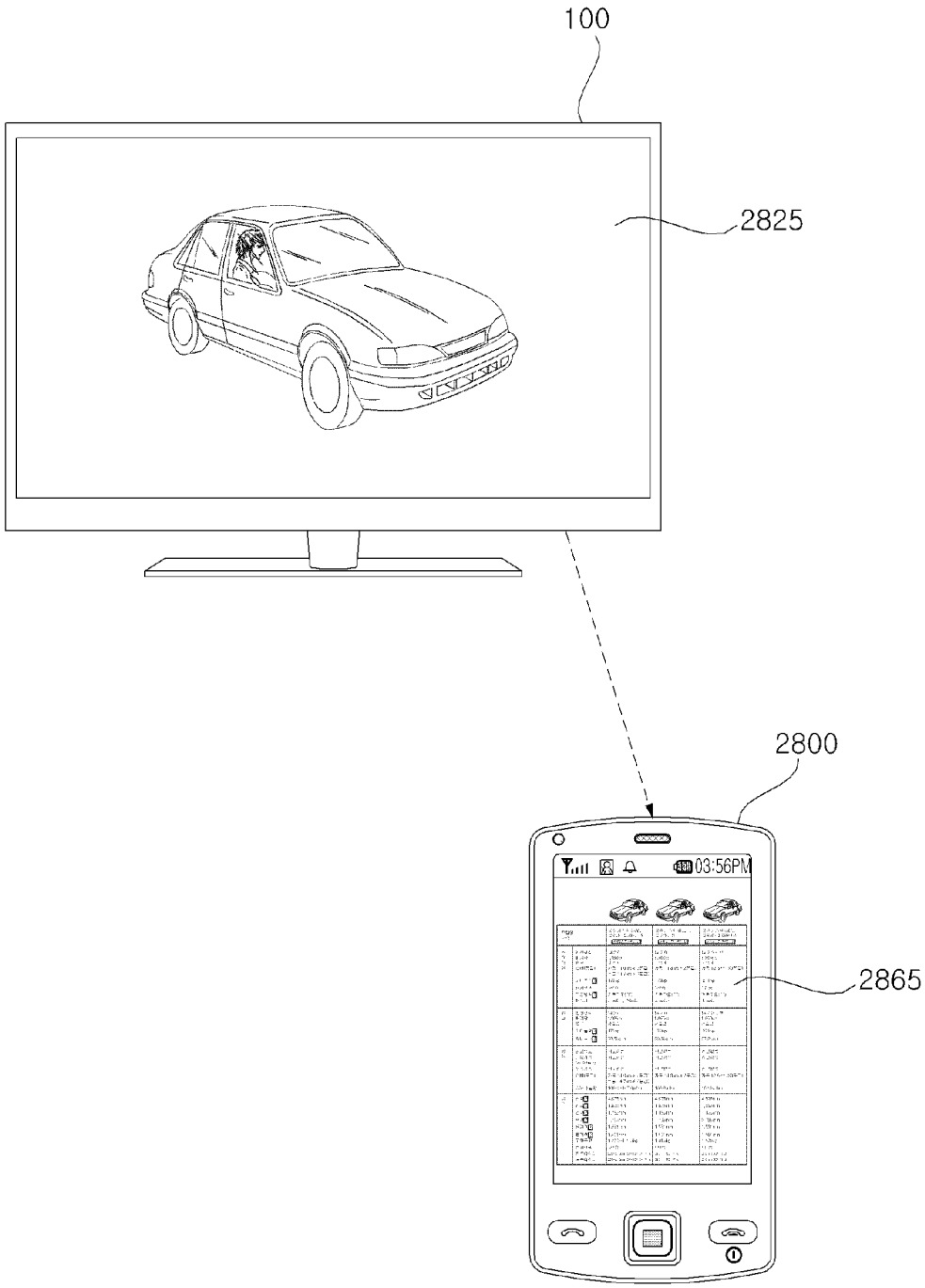


FIG. 29

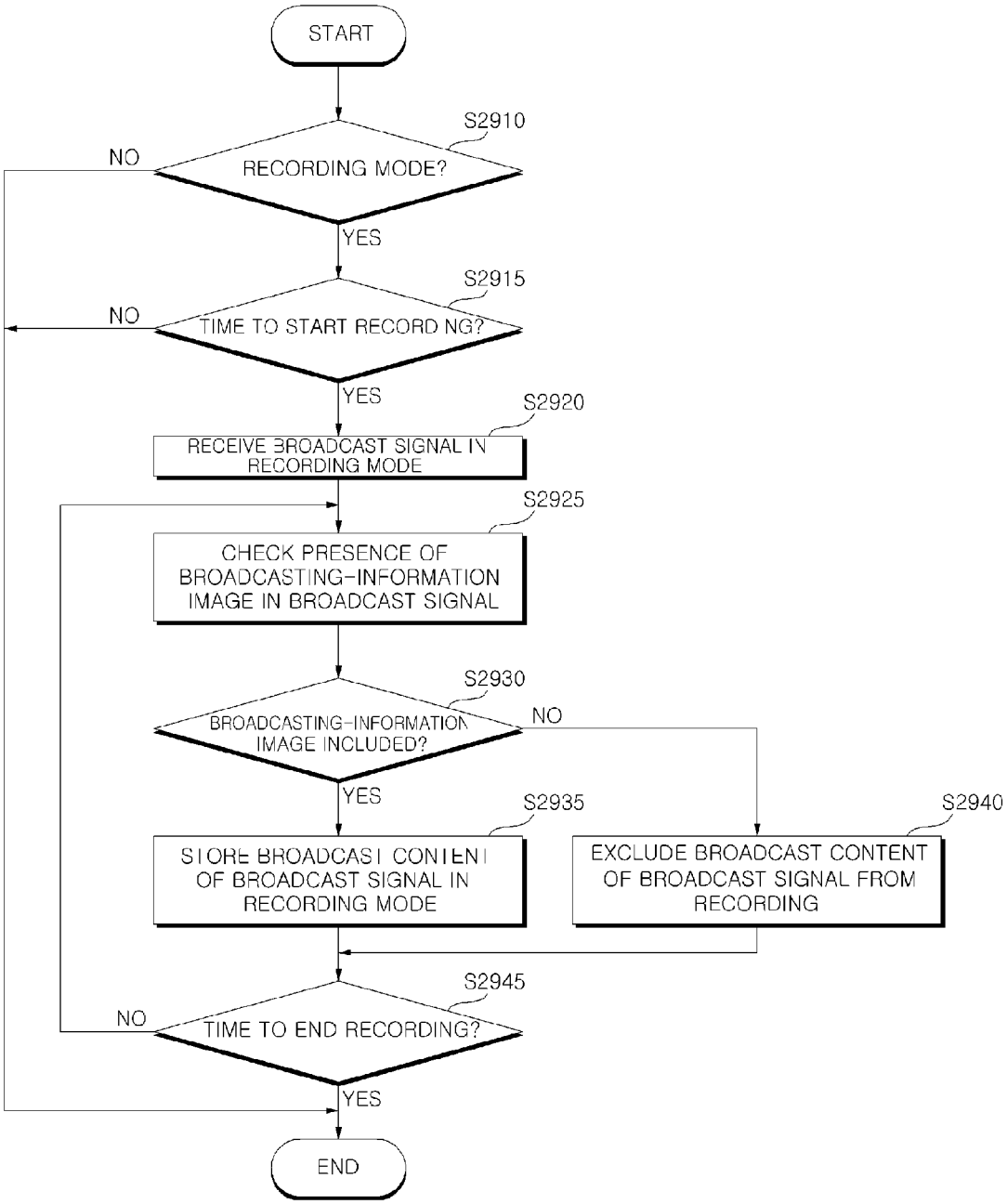

START
S2910
RECORDING MODE?
NO
YES
S2915
TIME TO START RECORD NG?
NO
YES
S2920
RECEIVE BROADCAST SIGNAL IN RECORDING MODE
S2925
CHECK PRESENCE OF BROADCASTING-INFORMATION IMAGE IN BROADCAST SIGNAL
S2930
BROADCASTING-INFORMATION IMAGE INCLUDED?
NO
YES
S2935
STORE BROADCAST CONTENT OF BROADCAST SIGNAL IN RECORDING MODE
S2940
EXCLUDE BROADCAST CONTENT OF BROADCAST SIGNAL FROM RECORDING
S2945
TIME TO END RECORDING?
NO
YES
END

FIG. 30

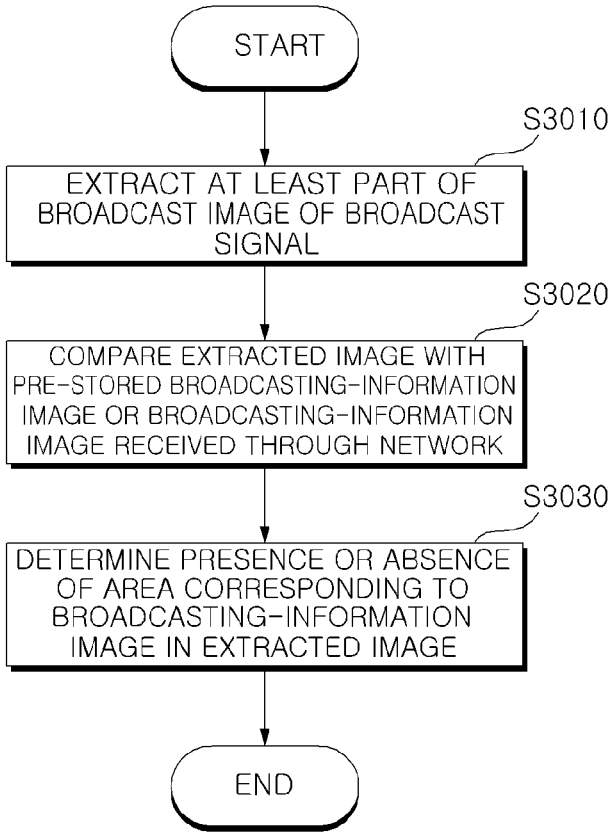
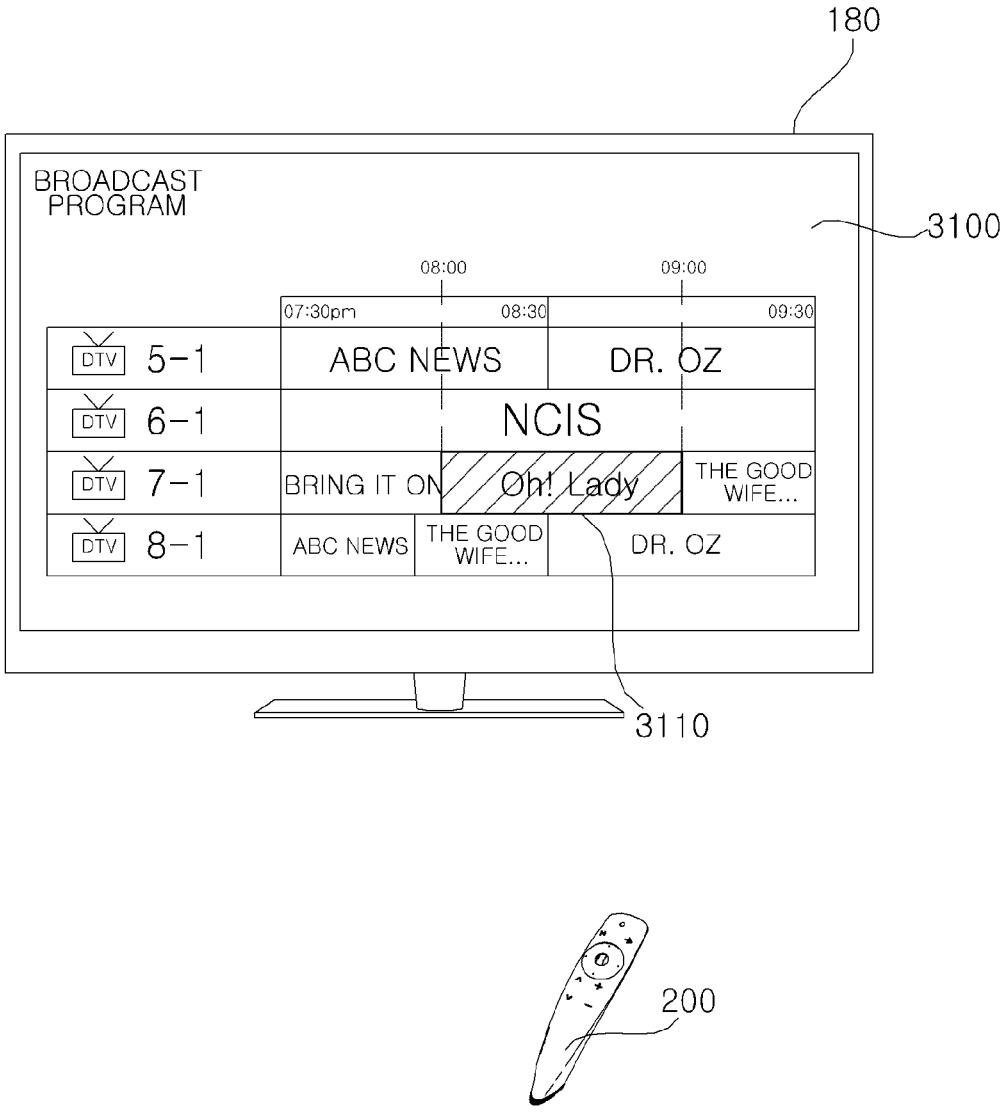
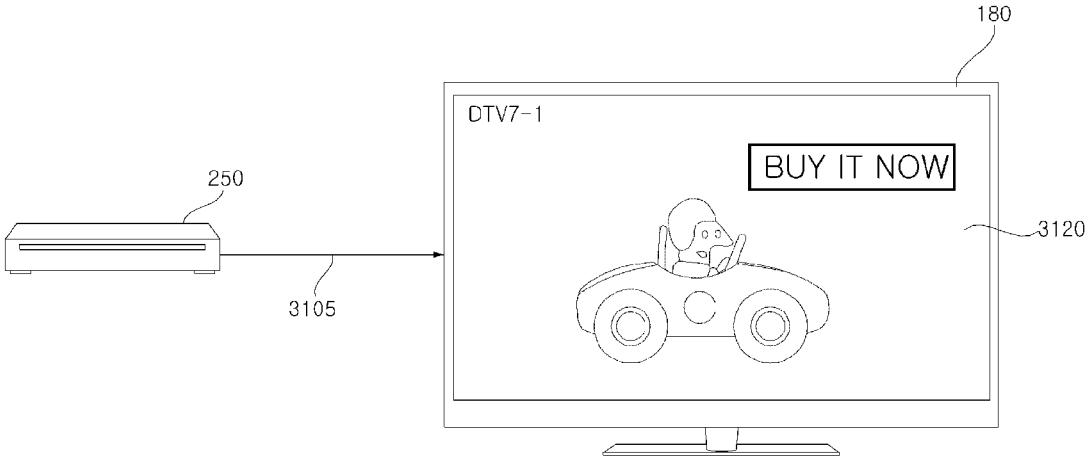

START
S3010
EXTRACT AT LEAST PART OF BROADCAST IMAGE OF BROADCAST SIGNAL
S3020
COMPARE EXTRACTED IMAGE WITH PRE-STORED BROADCASTING-INFORMATION IMAGE OR BROADCASTING-INFORMATION IMAGE RECEIVED THROUGH NETWORK
S3030
DETERMINE PRESENCE OR ABSENCE OF AREA CORRESPONDING TO BROADCASTING-INFORMATION IMAGE IN EXTRACTED IMAGE
END

FIG. 31A


180
BROADCAST PROGRAM
3100
08:00
09:00
07:30pm
08:30
09:30
DTV 5-1
ABC NEWS
DR. OZ
DTV 6-1
NCIS
DTV 7-1
BRING IT ON
Oh! Lady
THE GOOD WIFE...
DTV 8-1
ABC NEWS
THE GOOD WIFE...
DR. OZ
3110

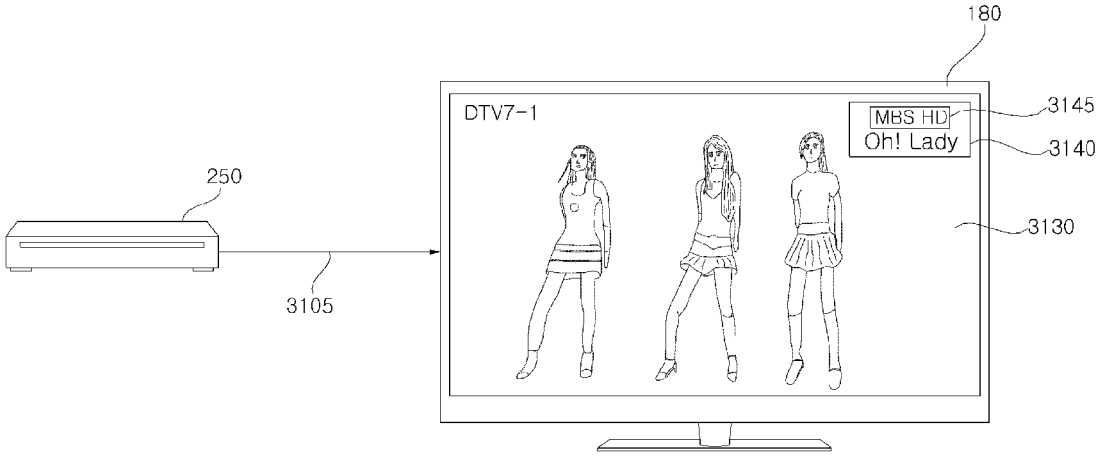
200

FIG. 31B



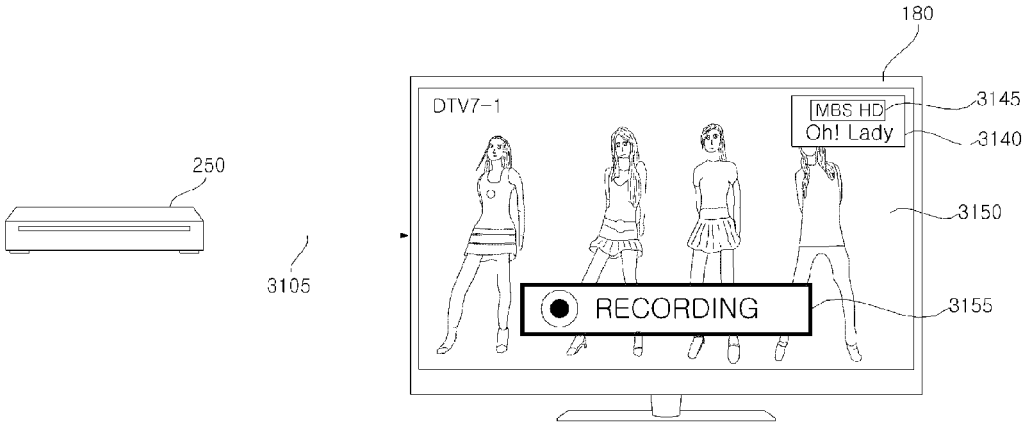
$T = t_1$

FIG. 31C



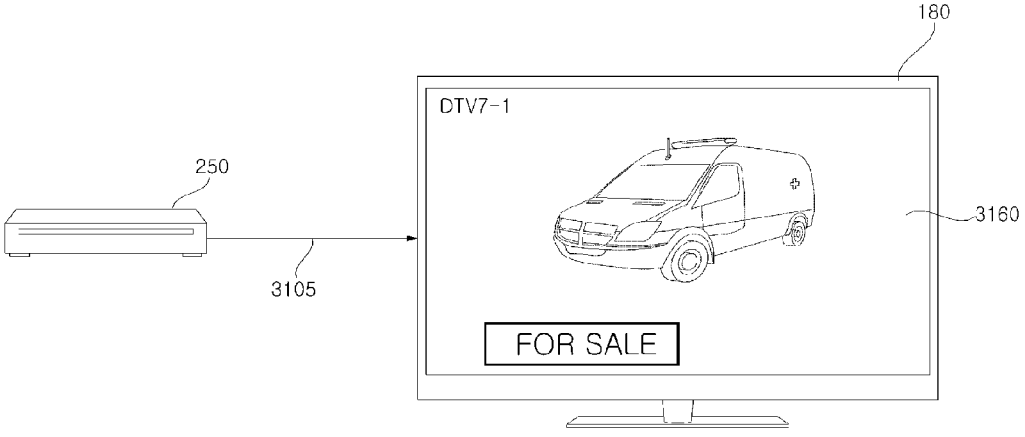
$T = t_2$

FIG. 31D



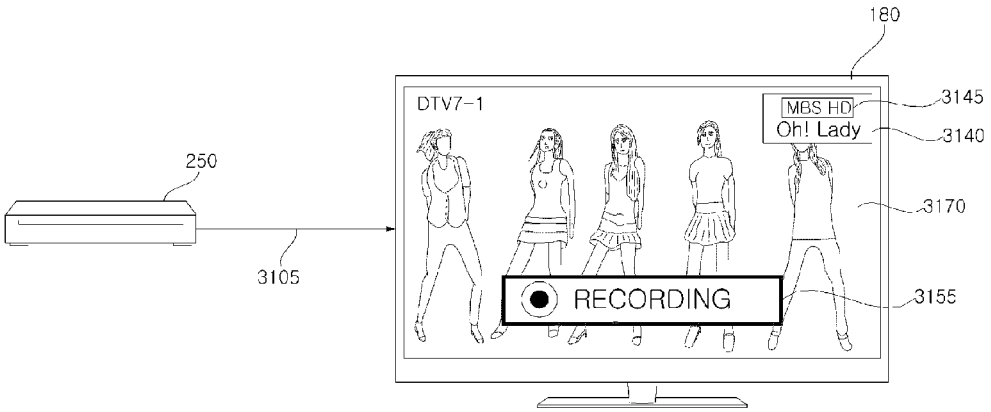
$T = t_3$

FIG. 31E



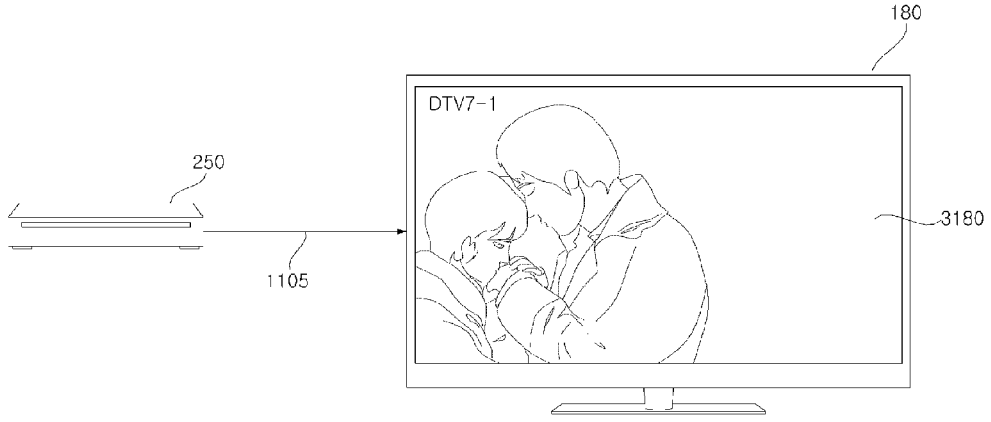
$T = t_4$

FIG. 31F



$T = t_5$

FIG. 31G



$T = t_6$

FIG. 32

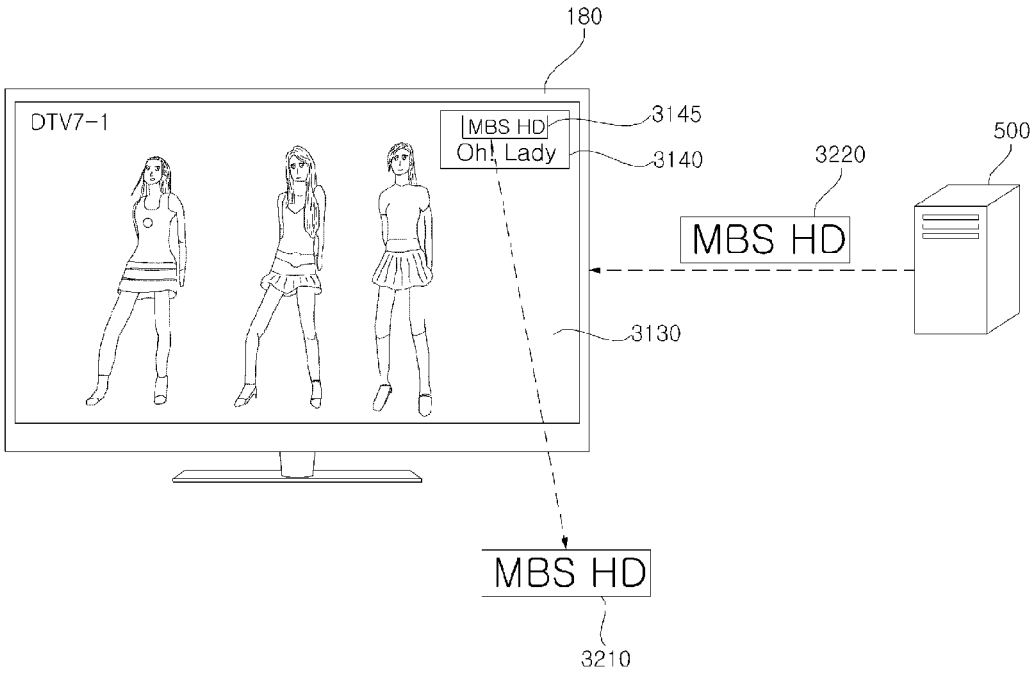

180
DTV7-1
MBS HD
Oh! Lady
3145
3140
3220
500
MBS HD
3130
MBS HD
3210

FIG. 33A

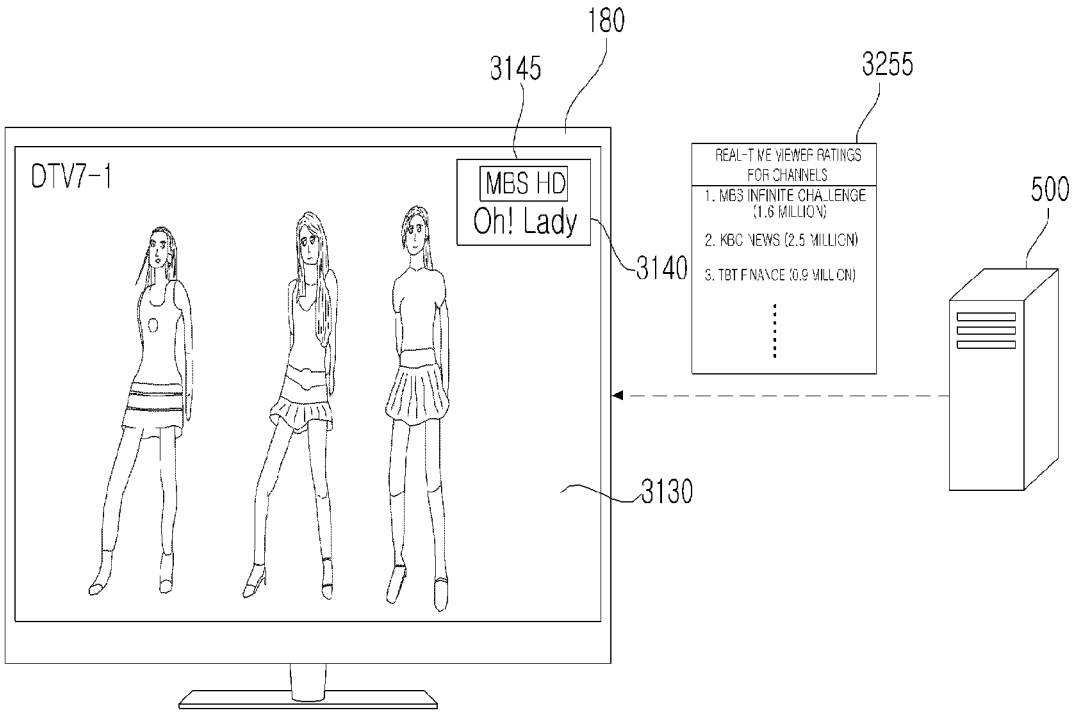

180
3145
3255
DTV7-1
MBS HD
Oh! Lady
3140
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHALLENGE (1.6 MILLION)
2. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
500
3130

FIG. 33B

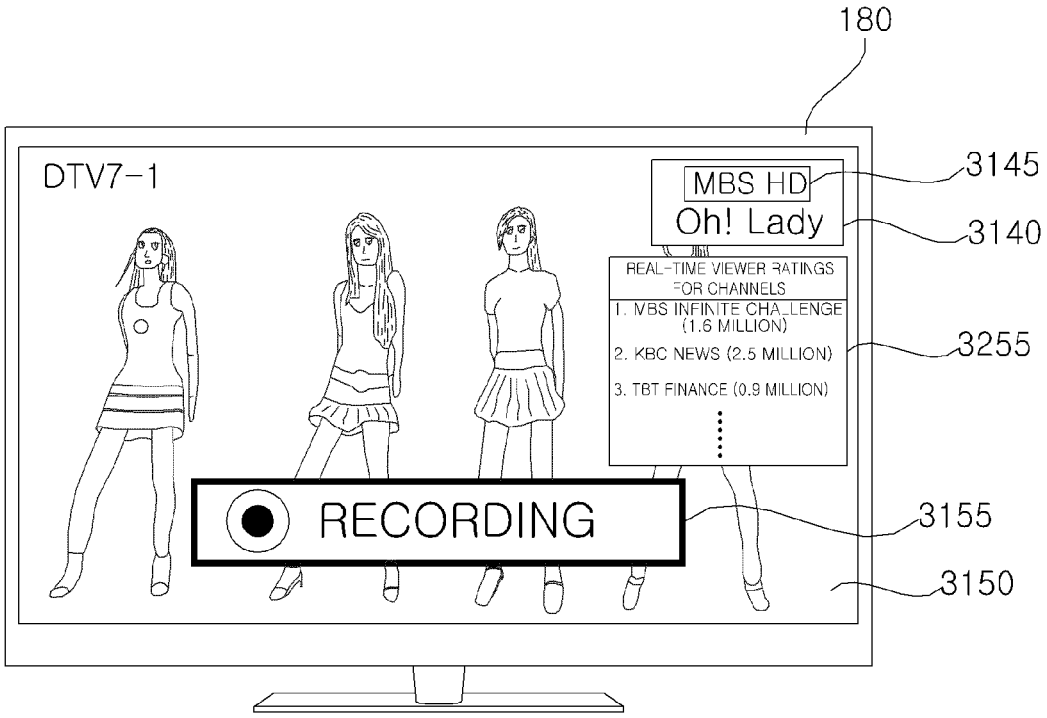

180
DTV7-1
MBS HD
Oh! Lady
3145
3140
REAL-TIME VIEWER RATINGS FOR CHANNELS
1. MBS INFINITE CHALLENGE (1.6 MILLION)
2. KBC NEWS (2.5 MILLION)
3. TBT FINANCE (0.9 MILLION)
3255
RECORDING
3155
3150

FIG. 34

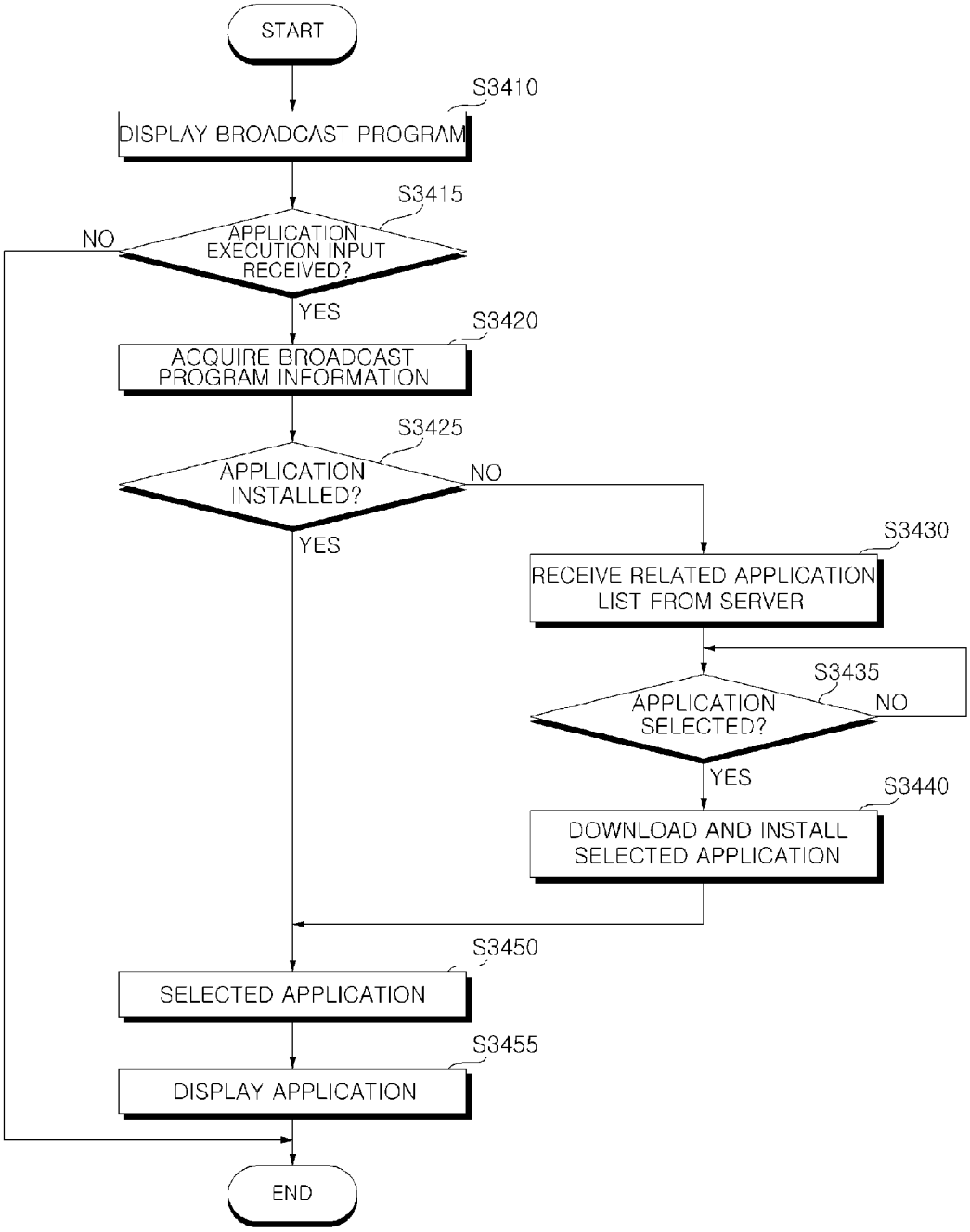

START
S3410
DISPLAY BROADCAST PROGRAM
S3415
APPLICATION EXECUTION INPUT RECEIVED?
NO
YES
S3420
ACQUIRE BROADCAST PROGRAM INFORMATION
S3425
APPLICATION INSTALLED?
NO
YES
S3430
RECEIVE RELATED APPLICATION LIST FROM SERVER
S3435
APPLICATION SELECTED?
NO
YES
S3440
DOWNLOAD AND INSTALL SELECTED APPLICATION
S3450
SELECTED APPLICATION
S3455
DISPLAY APPLICATION
END

FIG. 35

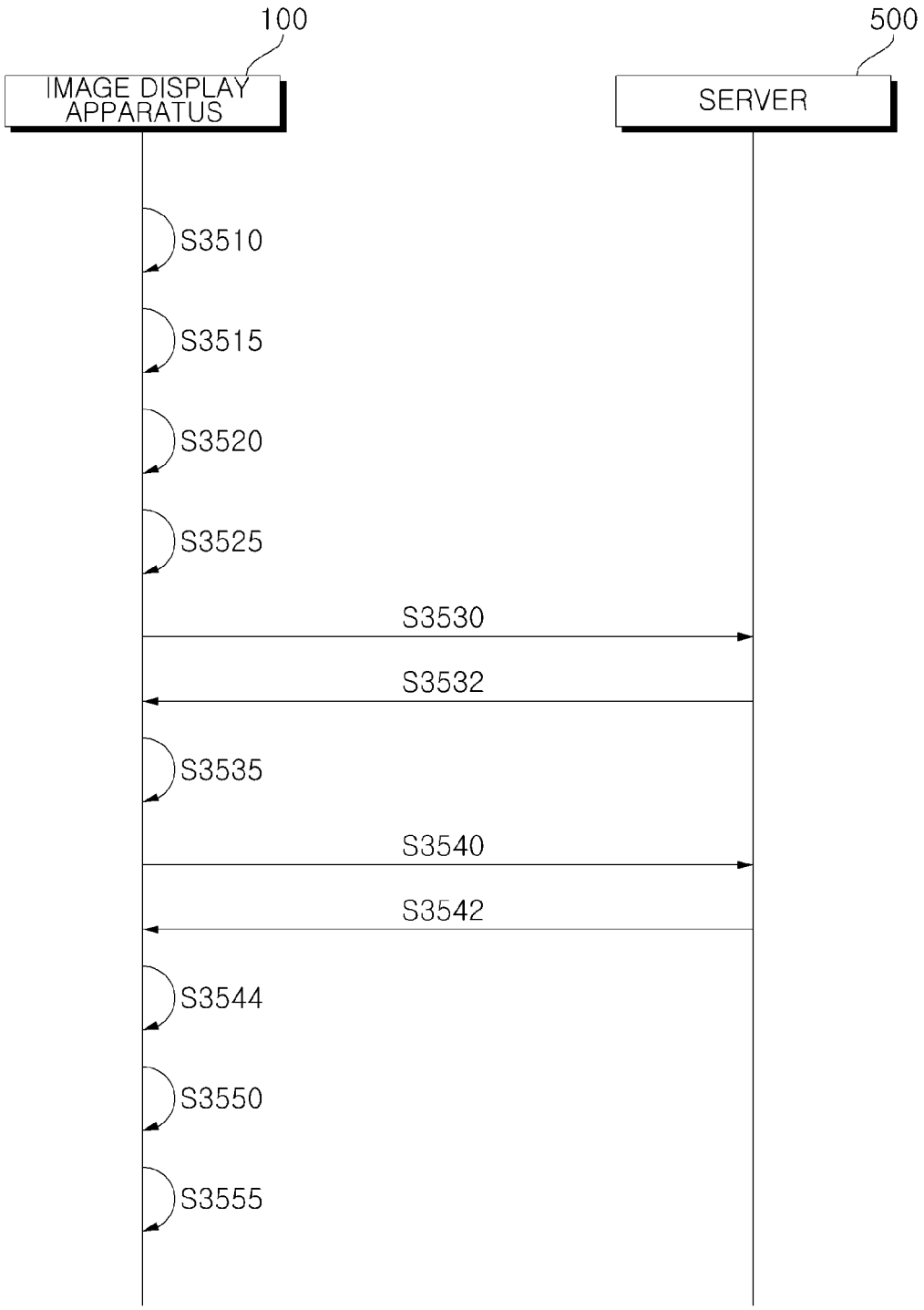

100
IMAGE DISPLAY APPARATUS
500
SERVER
S3510
S3515
S3520
S3525
S3530
S3532
S3535
S3540
S3542
S3544
S3550
S3555

FIG. 36A

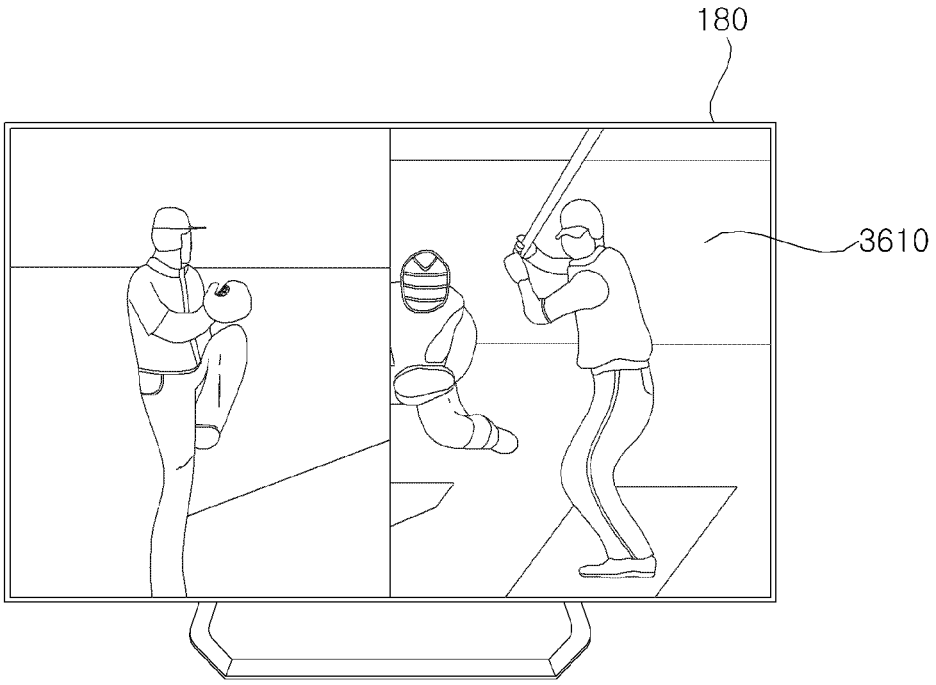


FIG. 36B

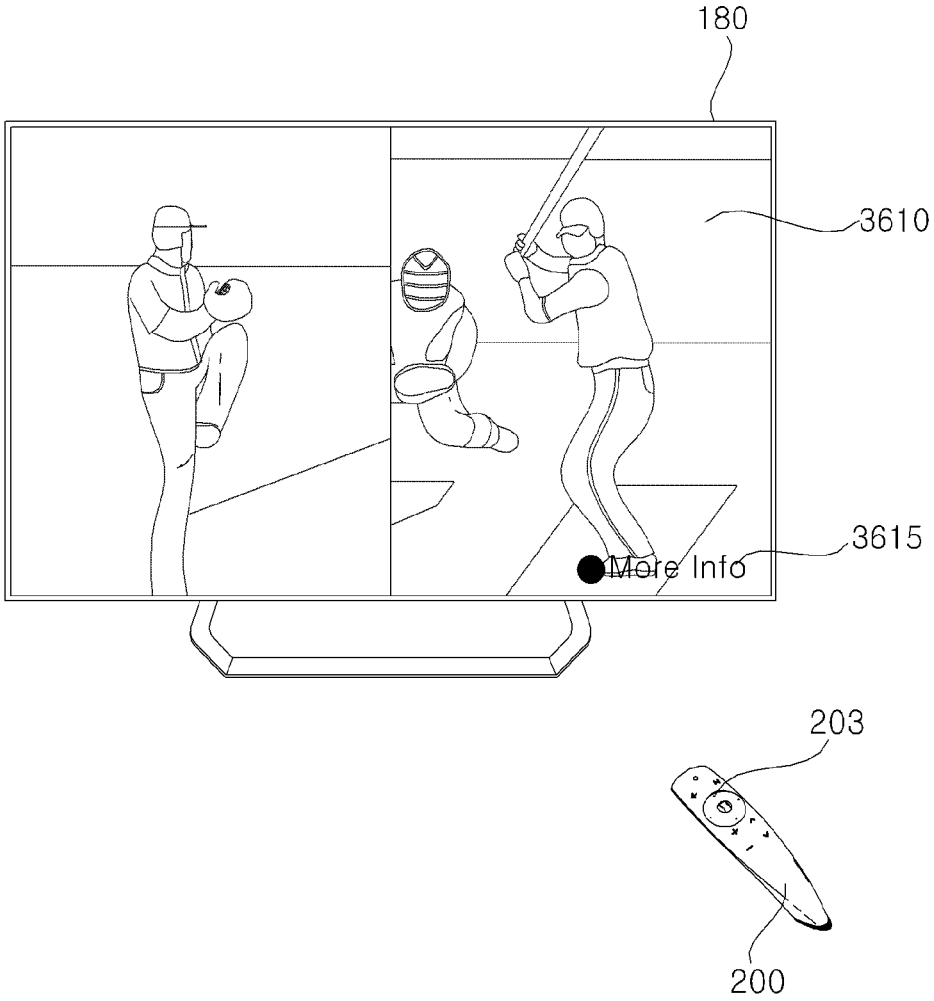


FIG. 36C

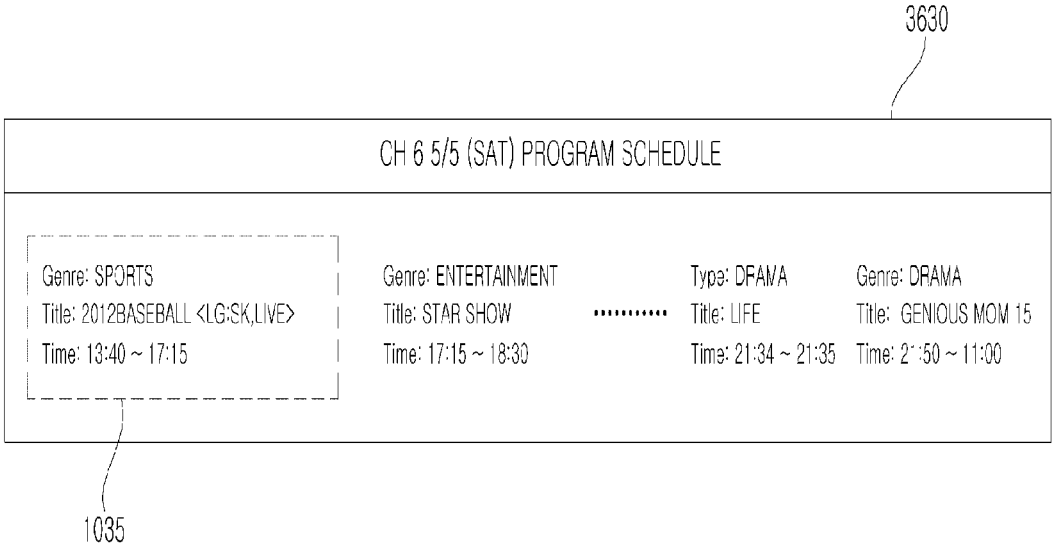

3630
CH 6 5/5 (SAT) PROGRAM SCHEDULE
Genre: SPORTS
Title: 2012BASEBALL <LG:SK,LIVE>
Time: 13:40 ~ 17:15
Genre: ENTERTAINMENT
Title: STAR SHOW
Time: 17:15 ~ 18:30
Type: DRAMA
Title: LIFE
Time: 21:34 ~ 21:35
Genre: DRAMA
Title: GENIOUS MOM 15
Time: 2[illegible]:50 ~ 11:00
1035

FIG. 36D

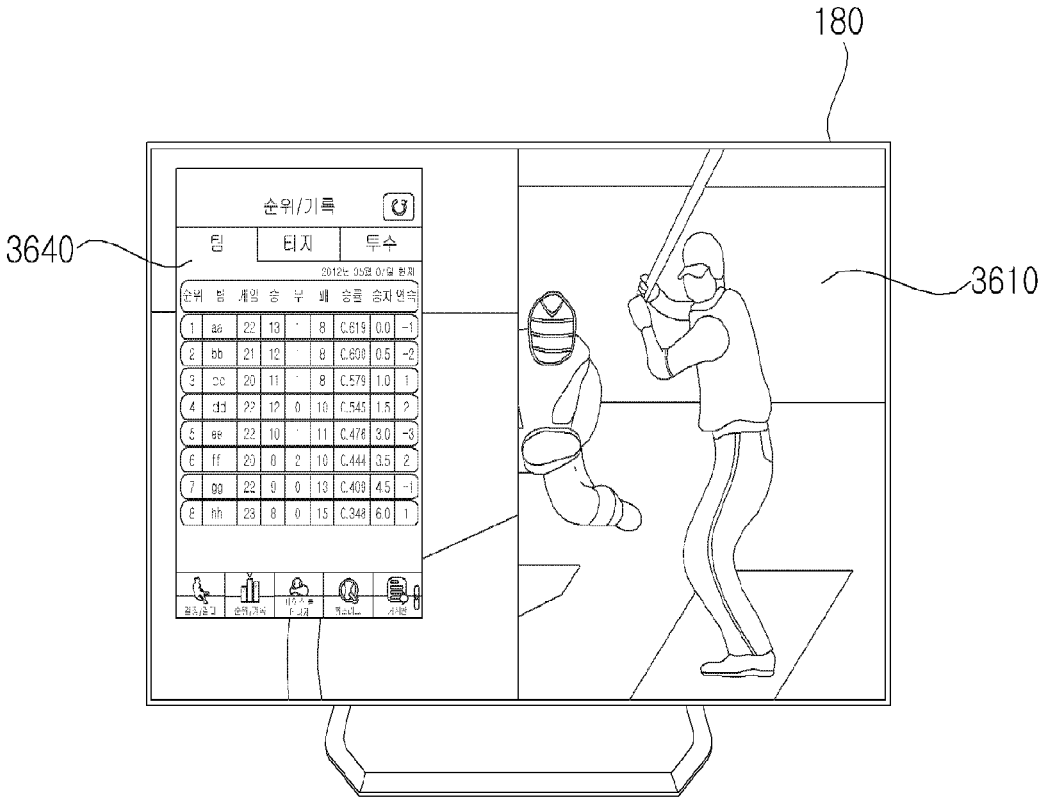

180
3640
3610
순위/기록
팀
타자
투수
순위 팀 게임 승 무 패 승률 승차 연속
1 aa 22 13 1 8 0.619 0.0 -1
2 bb 21 12 1 8 0.600 0.5 -2
3 cc 20 11 1 8 0.579 1.0 1
4 dd 22 12 0 10 0.545 1.5 2
5 ee 22 10 1 11 0.476 3.0 -3
6 ff 20 9 2 10 0.444 3.5 2
7 gg 22 9 0 13 0.409 4.5 -1
8 hh 23 8 0 15 0.348 6.0 1

FIG. 37A

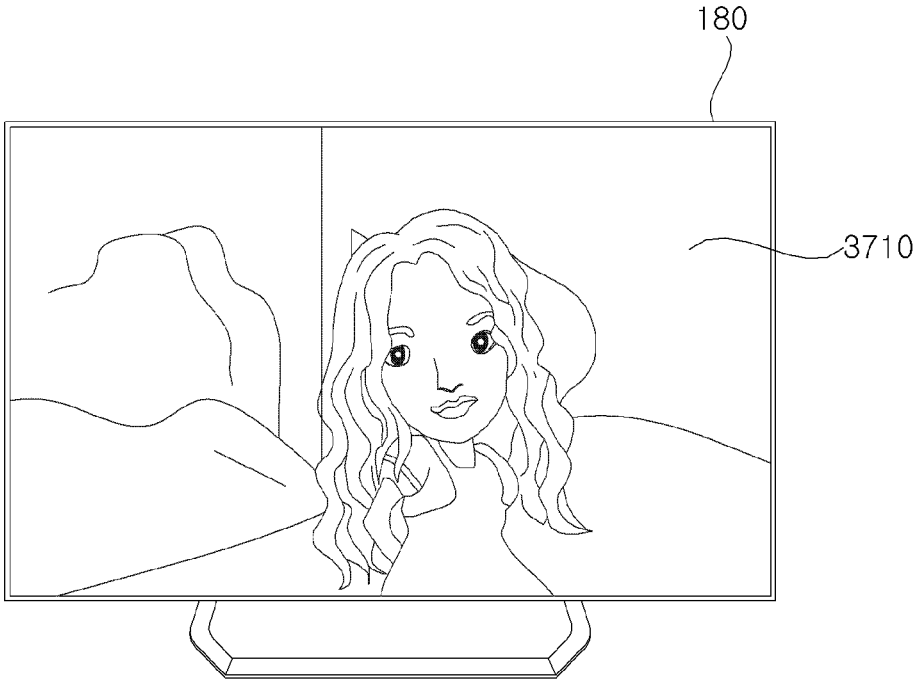


FIG. 37B

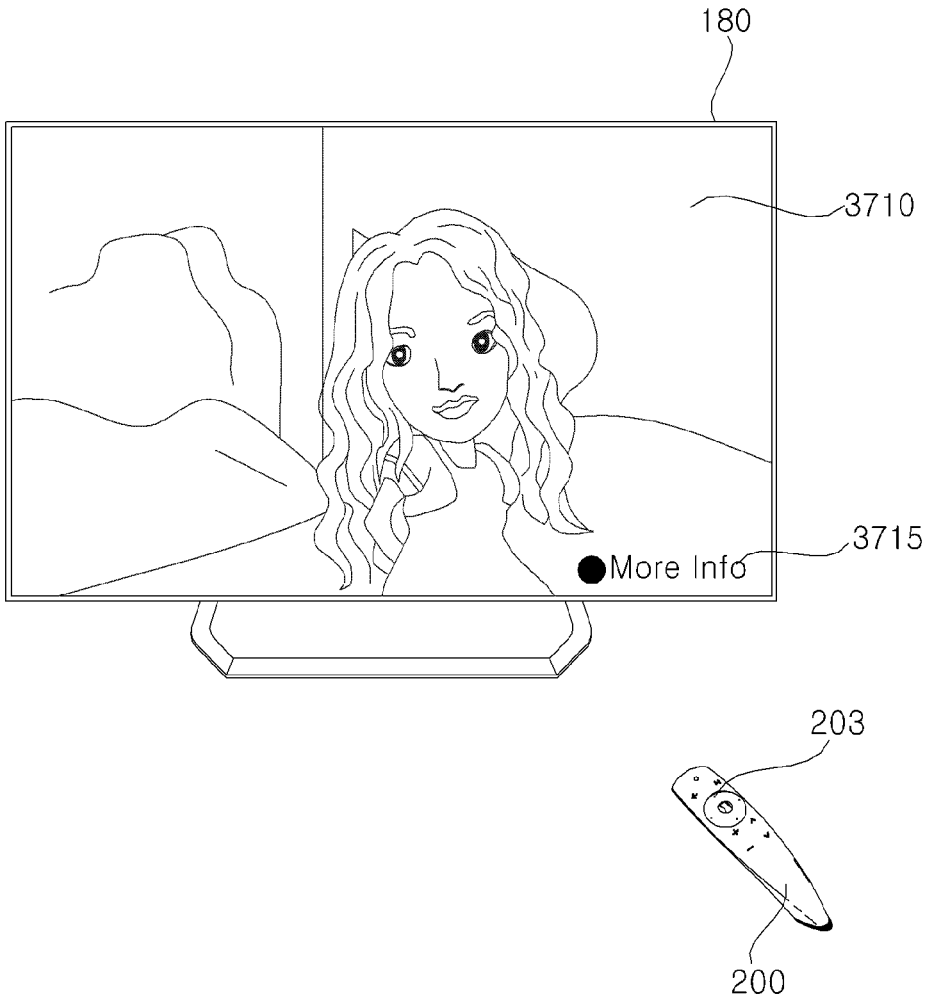


FIG. 37C

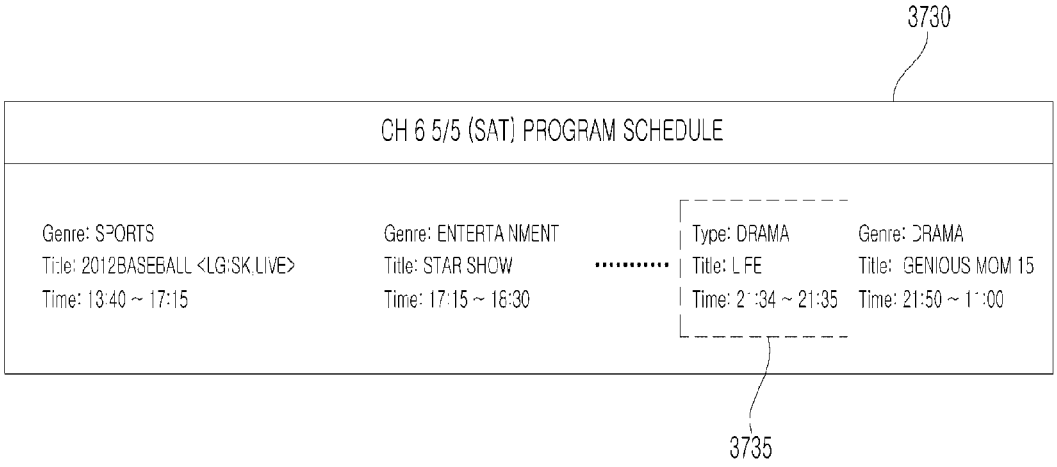


FIG. 37D

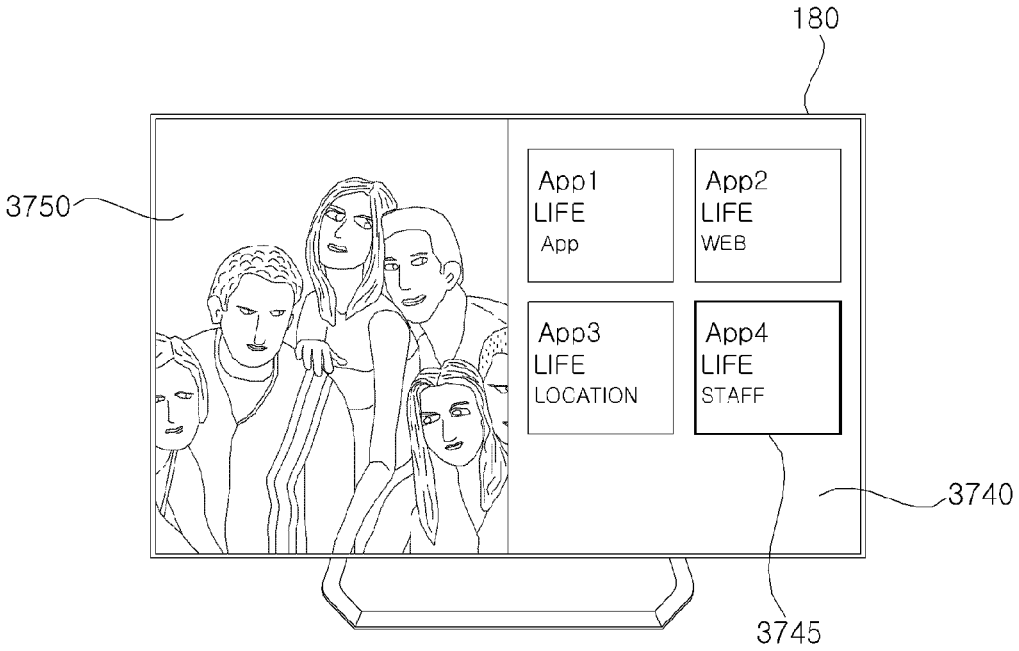


FIG. 37E

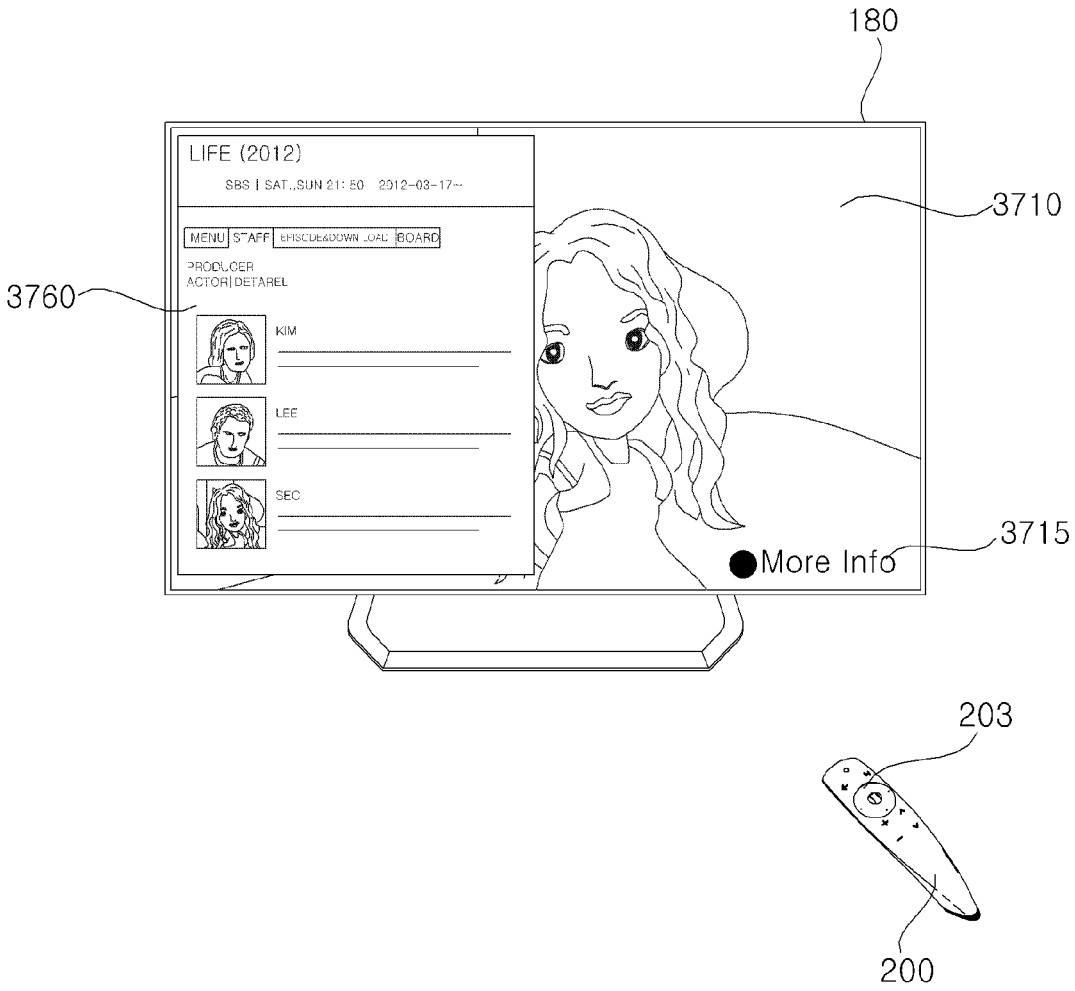

180
LIFE (2012)
SBS | SAT.,SUN 21: 50 2012-03-17~
MENU
STAFF
EPISODE&DOWN LOAD
BOARD
PRODUCER
ACTOR| DETAREL
KIM
LEE
SEC
3760
3710
More Info
3715
203
200

FIG. 38

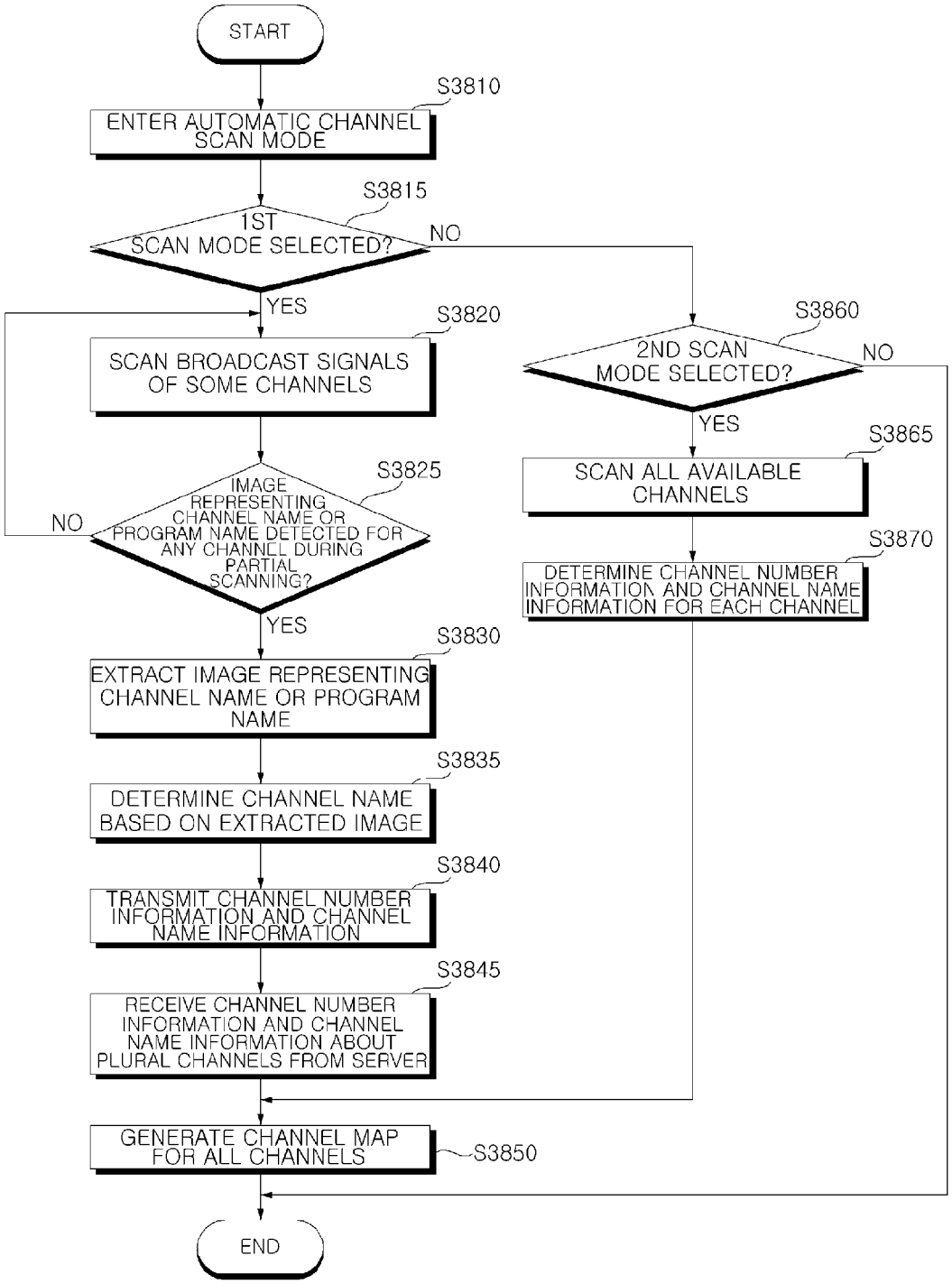

START
S3810
ENTER AUTOMATIC CHANNEL SCAN MODE
S3815
1ST SCAN MODE SELECTED?
NO
YES
S3820
SCAN BROADCAST SIGNALS OF SOME CHANNELS
S3825
IMAGE REPRESENTING CHANNEL NAME OR PROGRAM NAME DETECTED FOR ANY CHANNEL DURING PARTIAL SCANNING?
NO
YES
S3830
EXTRACT IMAGE REPRESENTING CHANNEL NAME OR PROGRAM NAME
S3835
DETERMINE CHANNEL NAME BASED ON EXTRACTED IMAGE
S3840
TRANSMIT CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION
S3845
RECEIVE CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION ABOUT PLURAL CHANNELS FROM SERVER
S3860
2ND SCAN MODE SELECTED?
NO
YES
S3865
SCAN ALL AVAILABLE CHANNELS
S3870
DETERMINE CHANNEL NUMBER INFORMATION AND CHANNEL NAME INFORMATION FOR EACH CHANNEL
GENERATE CHANNEL MAP FOR ALL CHANNELS
S3850
END

FIG. 39A

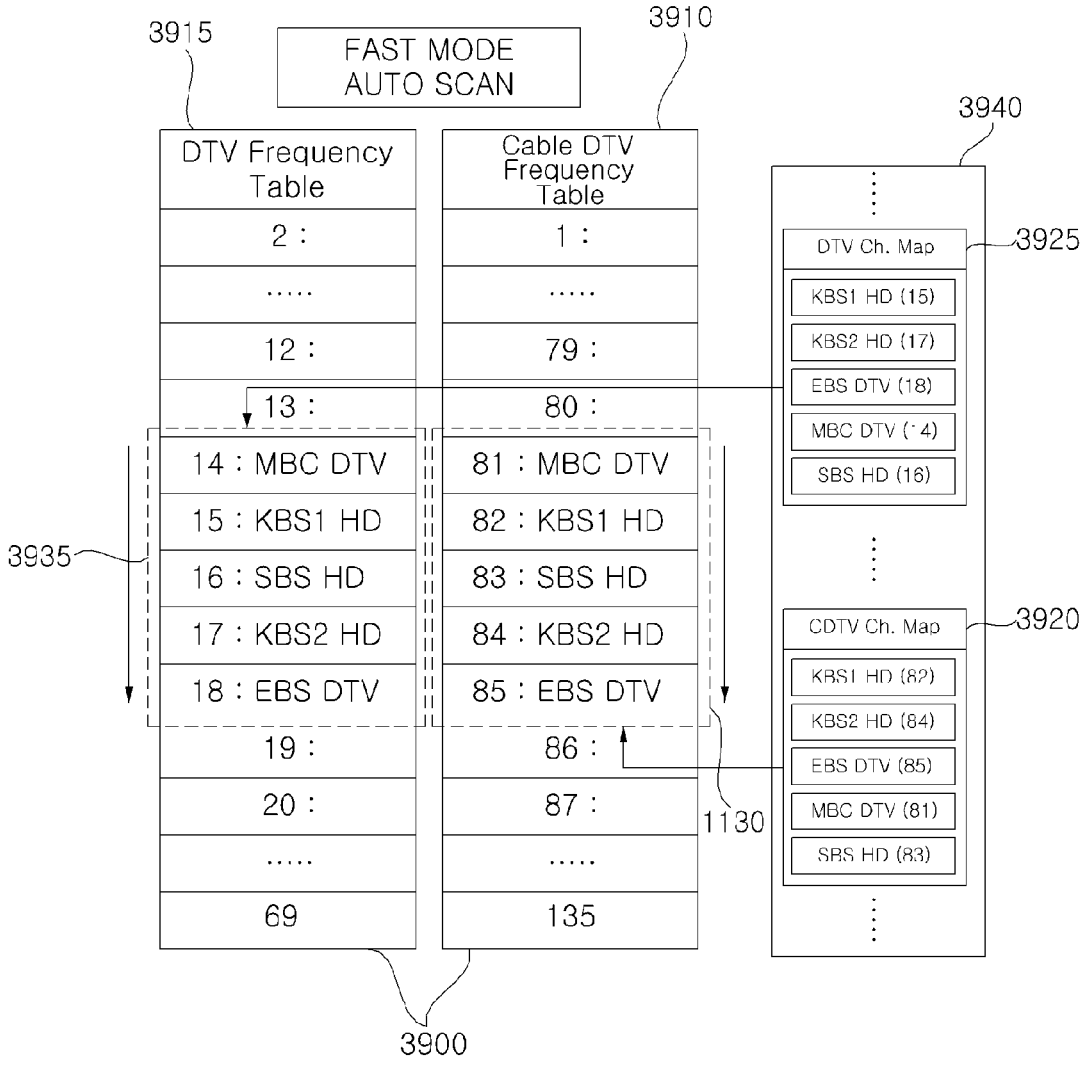

3915
FAST MODE
AUTO SCAN
3910
3940
DTV Frequency Table
Cable DTV Frequency Table
2 :
1 :
.....
.....
12 :
79 :
13 :
80 :
14 : MBC DTV
81 : MBC DTV
15 : KBS1 HD
82 : KBS1 HD
16 : SBS HD
83 : SBS HD
17 : KBS2 HD
84 : KBS2 HD
18 : EBS DTV
85 : EBS DTV
19 :
86 :
20 :
87 :
.....
.....
69
135
3935
1130
3900
DTV Ch. Map
3925
KBS1 HD (15)
KBS2 HD (17)
EBS DTV (18)
MBC DTV (*4)
SBS HD (16)
CDTV Ch. Map
3920
KBS1 HD (82)
KBS2 HD (84)
EBS DTV (85)
MBC DTV (81)
SBS HD (83)

FIG. 39B

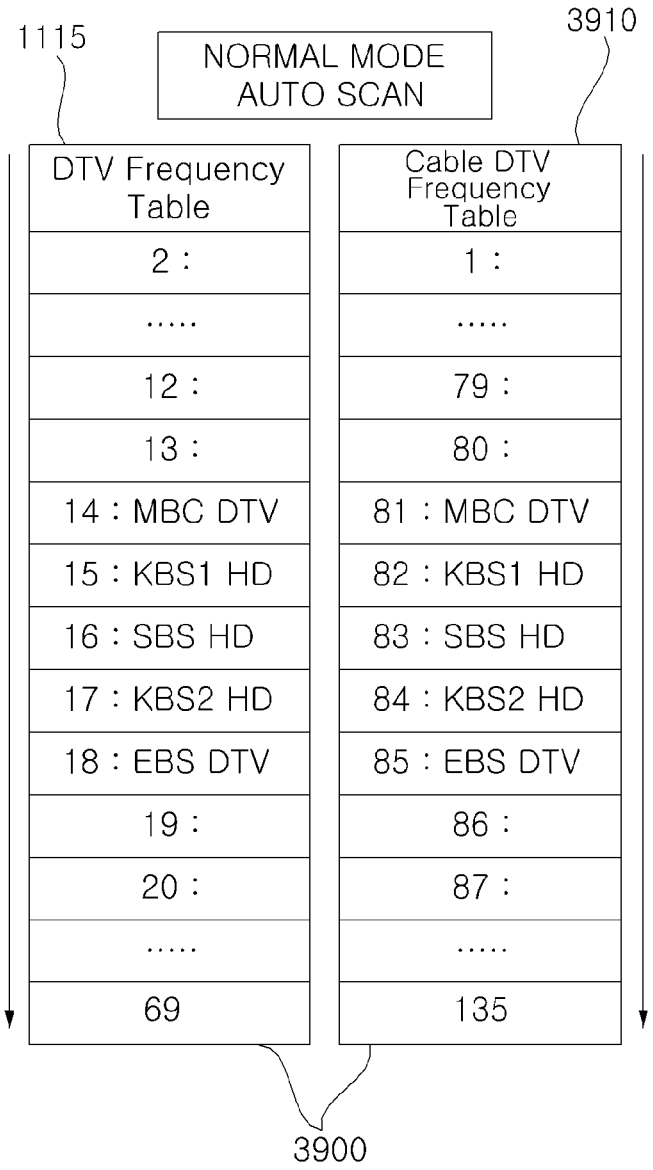

1115
NORMAL MODE
AUTO SCAN
3910
DTV Frequency Table
Cable DTV Frequency Table
2 :
1 :
.....
.....
12 :
79 :
13 :
80 :
14 : MBC DTV
81 : MBC DTV
15 : KBS1 HD
82 : KBS1 HD
16 : SBS HD
83 : SBS HD
17 : KBS2 HD
84 : KBS2 HD
18 : EBS DTV
85 : EBS DTV
19 :
86 :
20 :
87 :
.....
.....
69
135
3900

FIG. 40A

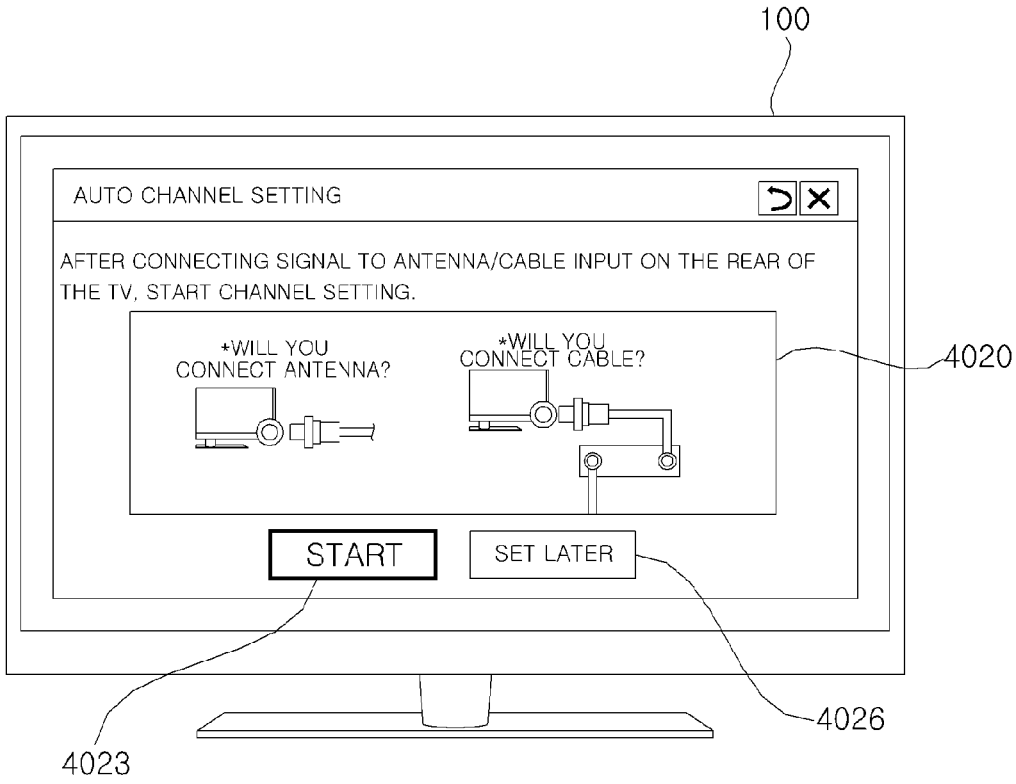

100
AUTO CHANNEL SETTING
AFTER CONNECTING SIGNAL TO ANTENNA/CABLE INPUT ON THE REAR OF THE TV, START CHANNEL SETTING.
*WILL YOU CONNECT ANTENNA?
*WILL YOU CONNECT CABLE?
4020
START
SET LATER
4023
4026

FIG. 40B

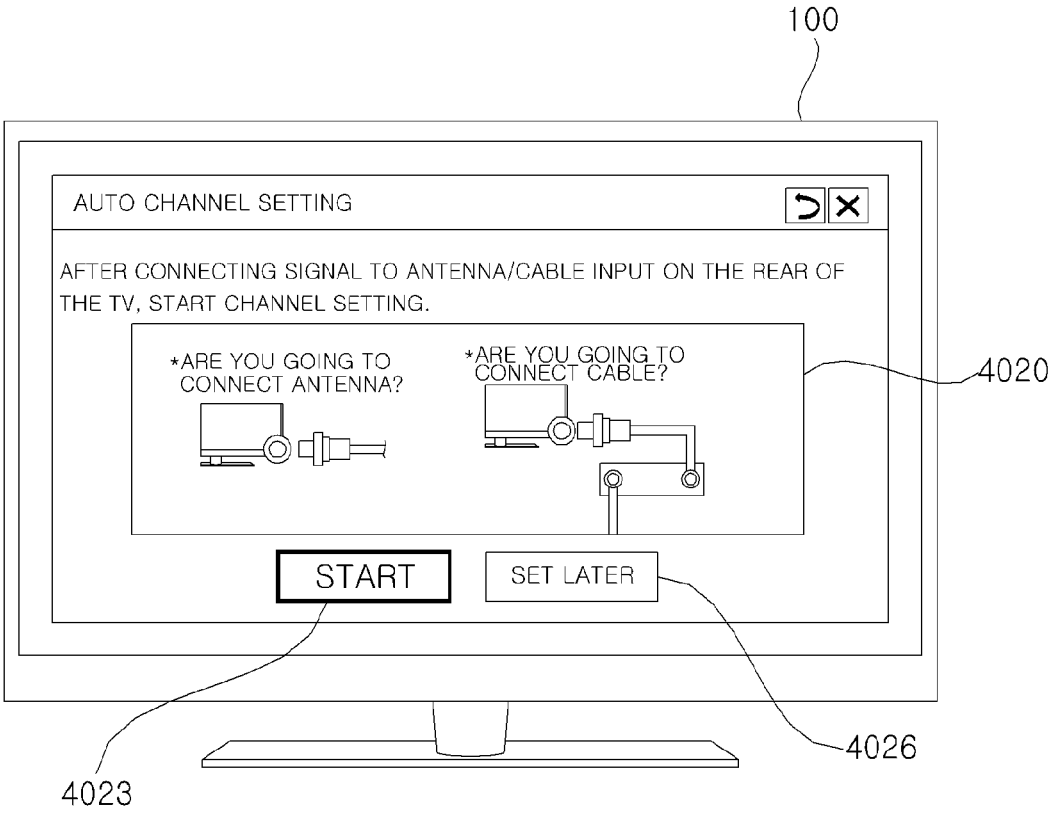

100
AUTO CHANNEL SETTING
AFTER CONNECTING SIGNAL TO ANTENNA/CABLE INPUT ON THE REAR OF THE TV, START CHANNEL SETTING.
*ARE YOU GOING TO CONNECT ANTENNA?
*ARE YOU GOING TO CONNECT CABLE?
4020
START
SET LATER
4023
4026

FIG. 40C

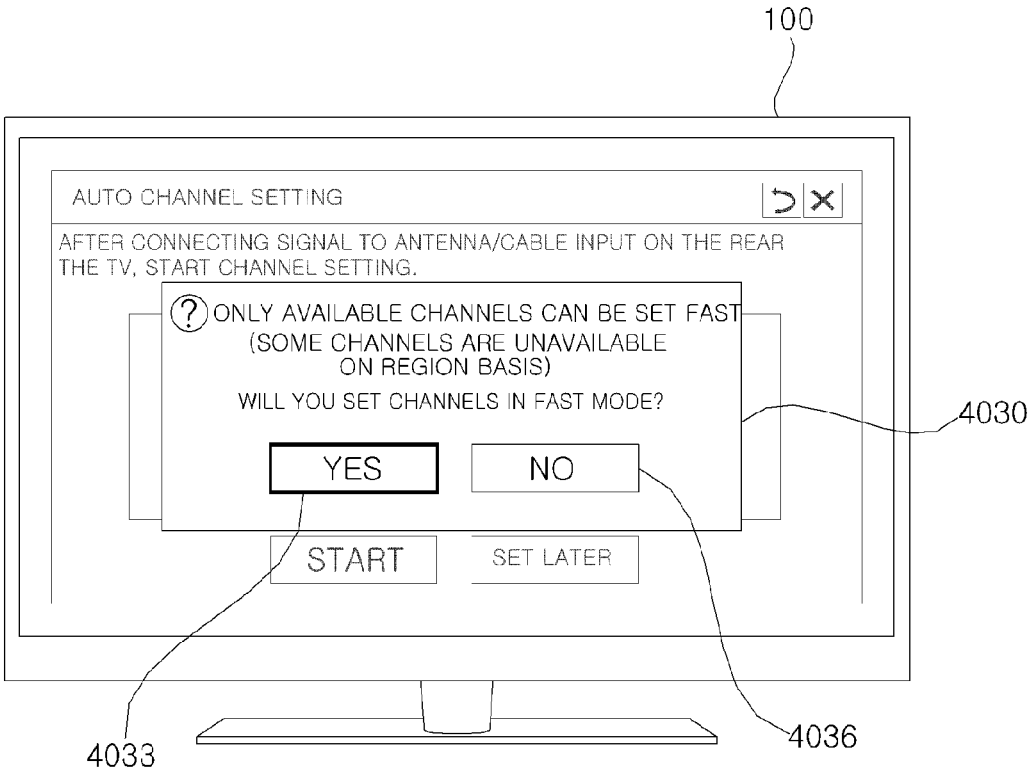

100
AUTO CHANNEL SETTING
AFTER CONNECTING SIGNAL TO ANTENNA/CABLE INPUT ON THE REAR THE TV, START CHANNEL SETTING.
ONLY AVAILABLE CHANNELS CAN BE SET FAST
(SOME CHANNELS ARE UNAVAILABLE ON REGION BASIS)
WILL YOU SET CHANNELS IN FAST MODE?
YES
NO
START
SET LATER
4030
4033
4036

IMAGE DISPLAY APPARATUS AND METHODS FOR OPERATING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Korean Patent Application Nos. 10-2011-0129854, filed on Dec. 6, 2011, 10-2012-0034537, filed on Apr. 3, 2012, 10-2012-0039823, filed on Apr. 17, 2012, 10-2012-0048754, filed on May 8, 2012, 10-2012-0081318, filed on Jul. 25, 2012, and 10-2012-0086762, filed on Aug. 8, 2012. The disclosure of all these applications is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an image display apparatus, a server, and methods for operating the same, and more particularly, to an image display apparatus, a server, and methods for operating the same, which can increase user convenience.

2. Description of the Related Art

An electronic device processes an electrical signal and operates based on the processed electrical signal, according to a user's manipulation. Among electronic devices, an image display apparatus has a function of displaying images to a user. The image display apparatus can display a broadcast program selected by the user on a display from among broadcast programs transmitted from broadcasting stations. The recent trend in broadcasting is a worldwide shift from analog broadcasting to digital broadcasting.

As it transmits digital audio and video signals, digital broadcasting offers many advantages over analog broadcasting, such as robustness against noise, less data loss, ease of error correction, and the ability to provide high-definition, clear images. Digital broadcasting also allows interactive viewer services, compared to analog broadcasting.

SUMMARY OF THE INVENTION

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide an image display apparatus, a server, and methods for operating the same, which can increase user convenience.

In accordance with an aspect of the present invention, the above and other objects can be accomplished by the provision of a method for operating an image display apparatus, including displaying a broadcast program list listing a plurality of broadcast programs, receiving, upon selection of one of the plurality of broadcast programs, a broadcast signal of the selected broadcast program, and displaying the received broadcast program. The broadcast program list includes real-time viewer rating information, a thumbnail image, and a name for each of the plurality of broadcast programs.

In accordance with another aspect of the present invention, there is provided a method for operating an image display apparatus, including displaying a broadcast program list listing a plurality of broadcast programs, transmitting, upon selection of one of the plurality of broadcast programs, channel information about the selected broadcast program to a remote controller, receiving a broadcast signal of the broadcast program corresponding to the channel information from a set-top box, and displaying the received broadcast program.

In accordance with a further aspect of the present invention, there is provided an image display apparatus including a display to display a broadcast program list listing a plurality of broadcast programs, a broadcasting receiver to receive, upon selection of one of the plurality of broadcast programs, a broadcast signal of the selected broadcast program, and a controller to control display of the received broadcast program. The broadcast program list includes real-time viewer rating information, a thumbnail image, and a name for each of the plurality of broadcast programs.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. **1** illustrates an image display system according to an embodiment of the present invention;

FIG. **2** is a block diagram of an image display apparatus according to an embodiment of the present invention;

FIGS. **3**A and **3**B are block diagrams of a set-top box according to embodiments of the present invention;

FIG. **4** is a block diagram of a controller illustrated in FIG. **2**;

FIG. **5** illustrates a method for controlling a remote controller illustrated in FIG. **2**;

FIG. **6** is a block diagram of the remote controller illustrated in FIG. **2**;

FIG. **7** is a block diagram of a server illustrated in FIG. **1**;

FIG. **8** is a flowchart illustrating a method for operating the image display apparatus according to an embodiment of the present invention;

FIG. **9** is a flowchart illustrating a method for operating the server according to an embodiment of the present invention;

FIG. **10** is a diagram illustrating a signal flow for performing an operation between the image display apparatus and the server according to an embodiment of the present invention;

FIGS. **11**A to **16**E are views referred to for describing various examples of the method for operating the image display apparatus illustrated in FIG. **8** or the method for operating the server illustrated in FIG. **9**;

FIG. **17** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention;

FIG. **18** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention;

FIG. **19** is a flowchart illustrating a method for operating the remote controller according to another embodiment of the present invention;

FIG. **20** is a flowchart illustrating a method for operating the server according to another embodiment of the present invention;

FIG. **21** is a diagram illustrating a signal flow for performing an operation among the image display apparatus, the server, the remote controller, and the set-top box according to another embodiment of the present invention;

FIGS. **22** to **24** are views referred to for describing various examples of the operation method illustrated in FIG. **18**, **19** or **20**;

FIG. **25** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention;

FIG. **26** is a flowchart illustrating a method for operating the server according to another embodiment of the present invention;

FIG. **27** is a diagram illustrating a signal flow for performing an operation between the image display apparatus and the server according to another embodiment of the present invention;

FIGS. **28**A to **28**G are views referred to for describing various examples of the method for operating the image display apparatus illustrated in FIG. **25** or the method for operating the server illustrated in FIG. **26**;

FIG. **29** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention;

FIG. **30** is a flowchart illustrating a method for detecting an image including broadcasting information in the image display apparatus according to another embodiment of the present invention;

FIGS. **31**A to **33**B are views referred to for describing various examples of the method for operating the image display apparatus illustrated in FIG. **29**;

FIG. **34** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention;

FIG. **35** is a diagram illustrating a signal flow for performing an operation between the image display apparatus and the server according to another embodiment of the present invention;

FIGS. **36**A to **37**E are views referred to for describing various examples of the method for operating the image display apparatus illustrated in FIG. **34**;

FIG. **38** is a flowchart illustrating a method for operating the image display apparatus according to a further embodiment of the present invention; and

FIGS. **39**A to **40**C are views referred to for describing various examples of the method for operating the image display apparatus illustrated in FIG. **38**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention will be described below with reference to the attached drawings.

The terms "module" and "unit" used to signify components are used herein to help the understanding of the components and thus they should not be considered as having specific meanings or roles. Accordingly, the terms "module" and "unit" may be used interchangeably.

FIG. **1** illustrates an image display system according to an embodiment of the present invention.

Referring to FIG. **1**, an image display system **10** according to an embodiment of the present invention may include an image display apparatus **100**, a set-top box **250**, and a server **500**.

The set-top box **250** may receive a broadcast signal, process the received broadcast signal, and transmit the processed broadcast signal to the image display apparatus **100**.

For the operation, the set-top box **250** may include a broadcasting receiver (**272** in FIG. **3**B) having a tuner and a demodulator. Aside from the broadcasting receiver, the set-top **250** may receive a broadcast image through a network interface (**255** in FIG. **3**A).

The set-top box **250** may receive a terrestrial broadcast signal, a satellite broadcast signal, a cable broadcast signal, an Internet Protocol TV (IPTV) broadcast signal, etc.

In addition to broadcast signals, the set-top box **250** may read a media signal from a storage medium such as an optical disk or a memory and process the media signal.

The image display apparatus **100** may receive a broadcast signal through an antenna or the set-top box **250**.

In the case where it receives a broadcast signal through the antenna, the image display apparatus **100** may receive the broadcast signal through a tuner unit **110** illustrated in FIG. **2**. The broadcast signal received through the antenna may be a terrestrial digital broadcast signal, a terrestrial analog broadcast signal, or a satellite digital broadcast signal.

In the case where it receives a broadcast signal through the set-top box **250**, the image display apparatus **100** may receive the broadcast signal through an external device interface **130** illustrated in FIG. **2**. The broadcast signal received through the set-top box **250** may be a terrestrial digital broadcast signal, a terrestrial analog broadcast signal, a cable digital broadcast signal, a cable analog broadcast signal, a satellite digital broadcast signal, or an IPTV broadcast signal.

In accordance with an embodiment of the present invention, the image display apparatus **100** may generate a channel map including information about channel numbers and channel names.

In the case of a terrestrial digital broadcast signal received through the antenna, since it includes channel number information and channel name information, the image display apparatus **100** may use the channel number information and channel name information in generating the channel map.

In the case of a terrestrial analog broadcast signal received through the antenna, it includes channel number information without channel name information. Therefore, the image display apparatus **100** cannot identify a channel name corresponding to the channel number.

In regard to a broadcast signal without channel name information such as a terrestrial analog broadcast signal, when a broadcast video includes an image indicating a channel name, the image is extracted and thus the channel name is acquired from the extracted image in the embodiment of the present invention. Specifically, a logo representing a channel name may be detected and thus the channel name may be acquired from the logo.

In contrast, in the absence of an image indicating a channel name in a broadcast image, it is difficult to acquire the channel name. In this case, the present invention provides a method for determining a channel name from a preliminarily created channel map. That is, the image display apparatus **100** transmits the channel map with channel number information and channel name information determined so far to the server **500**. The server **500** detects a channel map matching to the received channel number information and channel name information from among a plurality of stored channel maps and transmits information about the detected channel map to the image display apparatus **100**. In this manner, the image display apparatus **100** can determine the channel name in spite of the absence of an image indicating the channel name in a broadcast image, thereby completing the channel map.

The server **500** may receive channel number information and channel name information or channel map information from each of a plurality of image display apparatuses **100***a* to **100***n* through a network interface (**730** in FIG. **7**).

As described before, the server **500** selects a matching channel map for each of the image display apparatuses **100***a* to **100***n* based on channel number information and channel name information received from the image display apparatus and transmits information about the selected channel map to the image display apparatus.

If the server **500** does not preserve channel maps for the image display apparatuses **100***a* to **100***n*, it may receive channel maps from another server and select a matching channel map for each image display apparatus from among the channel maps.

In the case where the server **500** does not preserve channel maps for the image display apparatuses **100***a* to **100***n* and the channel maps are not available from another server, when a specific number of channel maps are the same among channel maps received from the image display apparatuses **100***a* to **100***n*, the server **500** may store the same channel map as a new channel map. Preferably, the same channel map may be completed using the channel maps received from the image display apparatuses **100***a* to **100***n* and then stored as a new channel map.

In the embodiment of the present invention, while the image display apparatus **100** is receiving a broadcast signal of a detected broadcast channel in channel scan mode, it extracts an image indicating a channel name, in the presence of the image indicating the channel name in a broadcast image, and acquires the channel name from the extracted image, as described above. Thus the image display apparatus **100** can generate a channel map simply using the channel number and the channel name, thereby increasing user convenience.

On the other hand, in the absence of an image indicating the channel name in the broadcast image, the image display apparatus **100** transmits channel number information and channel name information determined so far to the server **500**, receives channel map information from the server **500**, and updates the channel map using the received channel map information. Thus the image display apparatus **100** can complete the channel map so that it may include channel names for all channels.

In another embodiment of the present invention, the image display apparatus **100** may include an object with a plurality of broadcast program items. The object may be created based on real-time viewer rating information received from the server **500**.

Upon selection of one of the plurality of broadcast program items, the image display apparatus **100** may transmit channel information about the selected broadcast program to a remote controller **200**. The remote controller **200** may then transmit channel number information about the selected broadcast program based on the received channel information to the set-top box **250**.

Thus, the set-top box **250** may switch to a channel to transmit the selected broadcast program, receive the broadcast program, and transmit the received broadcast program. Accordingly, the image display apparatus **100** can simply display the broadcast program, thereby enabling the user to view an intended program easily.

Particularly, since the remote controller **200** communicates with the set-top box **250** in a first communication scheme and communicates with the image display apparatus **100** in a second communication scheme, the image display apparatus **100** and the set-top box **250** can be readily controlled with the single remote controller **200**.

Meanwhile, even though the object does not provide channel number information, any of the plurality of broadcast program items can be selected in a program-based manner. Therefore, the user can view an intended broadcast program reliably.

The server **500** may generate the real-time viewer rating information based on an image indicating a channel name or program name received from the image display apparatus **100**.

In another embodiment of the present invention, the image display apparatus **100** receives a broadcast signal from the set-top box **250** through an external device interface (**130** in FIG. **2**) and extracts broadcasting information or an image having the broadcasting information from the broadcast signal.

The image display apparatus **100** transmits the extracted broadcasting information or the extracted image including the broadcasting information to the server **500** through the network interface (**135** in FIG. **2**).

The server **500** receives broadcasting information or images including the broadcasting information from a plurality of image display apparatuses through the network interface (**730** in FIG. **7**). Then the server **500** generates real-time viewer rating information based on the received broadcasting information or the received images including the broadcasting information and transmits the real-time viewer rating information to at least one of the image display apparatuses.

In the case where the image display apparatus **100** receives a broadcast signal through the set-top box **250** instead of a broadcasting receiver (**105** in FIG. **2**) as described above, real-time viewer rating information is generated using broadcasting information or an image including the broadcasting information, included in the broadcast signal. Therefore, the user can readily identify a program or channel of interest, with increased convenience.

In another embodiment of the present invention, when a recording mode is set, the image display apparatus **100** may determine whether an image including broadcasting information exists in a broadcast signal and, in the presence of the image, may store broadcast content of the broadcast signal. Therefore, only user-intended broadcast content can be recorded correctly.

In another embodiment of the present invention, upon receipt of an application execution input, the image display apparatus **100** may acquire broadcast program information and execute a requested application based on the broadcast program information. Accordingly, the user can readily acquire additional information about a viewed broadcast program.

Applications are distinguished on a broadcast program basis. They may be downloaded from the server **500** and installed.

In another embodiment of the present invention, auto channel scan mode may be classified into fast mode and normal mode.

In fast mode, a part of the total channels are scanned and channel number information about the total channels are acquired fast based on channel number information and channel name information about the scanned channels. In this manner, a channel map is generated for the total channels.

In normal mode, all the channels are scanned and channel number information is determined for the channels. Accordingly, a channel map is generated using the channel number information about the entire channels.

In another embodiment of the present invention, in fast mode, the image display apparatus **100** scans broadcast signals of a part of all channels, extracts images indicating channel names or program names from broadcast images of broadcast signals of the scanned channels, determines channel number information and channel name information about the broadcast signals, transmits the determined channel number information and channel name information to the server **500**, and receives channel number information and channel name information about a plurality of channels including the scanned channels. Thus, channel number information about all channels can be determined fast.

The image display apparatus **100** may be any of a TV, monitor, PC, etc. that can display a broadcast program.

The server **500** may be one of a content server for providing content, a service server for providing a service, and a network server for providing a network.

FIG. **2** is a block diagram of the image display apparatus according to an embodiment of the present invention. Referring to FIG. **2**, the image display apparatus **100** according to an embodiment of the present invention includes a broadcasting receiver **105**, an external device interface **130**, a network interface **135**, a memory **140**, a user input interface **150**, a sensor unit (not shown), a controller **170**, a display **180**, and an audio output unit **185**.

The broadcasting receiver **105** may include the tuner unit **110**, a demodulator **120**, and a network interface **130**. As needed, the broadcasting receiver **105** may be configured so as to include only the tuner unit **110** and the demodulator **120** or only the network interface **130**.

Unlike the configuration illustrated in FIG. **2**, the broadcasting receiver **105** may include the external device interface **130**. For example, a broadcast signal from the set-top box **250** may be received through the external device interface **130**.

The tuner unit **110** selects a Radio Frequency (RF) broadcast signal corresponding to a channel selected by a user or an RF broadcast signal corresponding to each of pre-stored channels from among a plurality of RF broadcast signals received through an antenna and downconverts the selected RF broadcast signal into a digital Intermediate Frequency (IF) signal or an analog baseband Audio/Video (A/V) signal.

More specifically, if the selected RF broadcast signal is a digital broadcast signal, the tuner unit **110** downconverts the selected RF broadcast signal into a digital IF signal, DIF. On the other hand, if the selected RF broadcast signal is an analog broadcast signal, the tuner unit **110** downconverts the selected RF broadcast signal into an analog baseband A/V signal, CVBS/SIF. That is, the tuner unit **110** may be a hybrid tuner capable of processing not only digital broadcast signals but also analog broadcast signals. The analog baseband A/V signal CVBS/SIF may be directly input to the controller **170**.

The tuner unit **110** may be capable of receiving RF broadcast signals from an Advanced Television Systems Committee (ATSC) single-carrier system or from a Digital Video Broadcasting (DVB) multi-carrier system.

The tuner unit **110** may sequentially select a number of RF broadcast signals corresponding to all broadcast channels previously stored in the image display apparatus **100** by a channel add function from a plurality of RF signals received through the antenna and may downconvert the selected RF broadcast signals into IF signals or baseband A/V signals.

The tuner unit **110** may include a plurality of tuners for receiving broadcast signals on a plurality of channels. Alternatively, the tuner unit **110** may be implemented into a single tuner for simultaneously receiving broadcast signals on a plurality of channels.

The demodulator **120** receives the digital IF signal DIF from the tuner unit **110** and demodulates the digital IF signal DIF.

The demodulator **120** may perform demodulation and channel decoding on the digital IF signal DIF, thereby obtaining a stream signal TS. The stream signal TS may be a signal in which a video signal, an audio signal and a data signal are multiplexed.

The stream signal TS may be input to the controller **170** and thus subjected to demultiplexing and A/V signal processing. The processed video and audio signals are output to the display **180** and the audio output unit **185**, respectively.

The external device interface **130** may serve as an interface between a connected external device and the image display apparatus **100**. For interfacing, the external device interface **130** may include an A/V Input/Output (I/O) unit (not shown) and/or a wireless communication module (not shown).

The external device interface **130** may be connected to an external device such as a Digital Versatile Disk (DVD) player, a Blu-ray player, a game console, a camera, a camcorder, a computer (e.g., a laptop computer), or a set-top box, wirelessly or by wire. Then, the external device interface **130** transmits and receives signals to and from the external device.

The A/V I/O unit of the external device interface **130** may receive video, audio, and/or data signals from the external device. The wireless communication module of the external device interface **130** may perform short-range wireless communication with other electronic devices.

The network interface **135** serves as an interface between the image display apparatus **100** and a wired/wireless network such as the Internet. The network interface **135** may receive content or data from the Internet, a Content Provider (CP), or a Network Provider (NP).

The memory **140** may store various programs necessary for the controller **170** to process and control signals, and may also store processed video, audio and data signals.

The memory **140** may temporarily store a video, audio and/or data signal received from the external device interface **130**. The memory **140** may store information about broadcast channels by the channel-add function such as a channel map.

While the memory **140** is shown in FIG. **2** as configured separately from the controller **170**, to which the present invention is not limited, the memory **140** may be incorporated into the controller **170**, for example.

The user input interface **150** transmits a signal received from the user to the controller **170** or transmits a signal received from the controller **170** to the user.

For example, the user input interface **150** may receive various user input signals such as a power-on/off signal, a channel selection signal, and a screen setting signal from a remote controller **200**, provide the controller **170** with user input signals received from local keys (not shown), such as inputs of a power key, a channel key, and a volume key, and a setting key, transmit a control signal received from a sensor unit (not shown) for sensing a user gesture to the controller **170**, or transmit a signal received from the controller **170** to the sensor unit.

The controller **170** may demultiplex the stream signal TS received from the tuner unit **110**, the demodulator **120**, or the external device interface **130** into a number of signals and process the demultiplexed signals into audio and video data.

The video signal processed by the controller **170** may be displayed as an image on the display **180**. The video signal processed by the controller **170** may also be transmitted to an external output device through the external device interface **130**.

The audio signal processed by the controller **170** may be output to the audio output unit **185**. Also, the audio signal processed by the controller **170** may be transmitted to the external output device through the external device interface **130**.

While not shown in FIG. **2**, the controller **170** may include a demultiplexer (DEMUX) and a video processor, which will be described later with reference to FIG. **4**.

In addition, the controller **170** may provide overall control to the image display apparatus **100**. For example, the controller **170** may control the tuner unit **110** to select an RF broadcast signal corresponding to a user-selected channel or a pre-stored channel.

The controller **170** may control the image display apparatus **100** according to a user command received through the user input interface **150** or according to an internal program.

The controller **170** may also control the display **180** to display images. The image displayed on the display **180** may be a two-Dimensional (2D) or three-Dimensional (3D) still image or moving picture.

The controller **170** may control a particular object in the image displayed on the display **180** to be rendered as a 3D object. For example, the particular object may be at least one of a linked Web page (e.g. from a newspaper, a magazine, etc.), an Electronic Program Guide (EPG), a menu, a widget, an icon, a still image, a moving picture, or text.

This 3D object may be processed to have a different depth from the image displayed on the display **180**. Preferably, the 3D object may appear protruding relative to the image displayed on the display **180**.

The controller **170** may locate the user based on an image captured by a camera unit (not shown). Specifically, the controller **170** may measure the distance (a z-axis coordinate) between the user and the image display apparatus **100**. In addition, the controller **170** may calculate x-axis and y-axis coordinates corresponding to the position of the user on the display **180**.

The image display apparatus **100** may further include a channel browsing processor (not shown) for generating thumbnail images corresponding to channel signals or external input signals. The channel browsing processor may extract some of the video frames of each of stream signals TS received from the demodulator **120** or stream signals received from the external device interface **130** and display the extracted video frames on the display **180** as thumbnail images. The thumbnail images may be output to the controller **170** after they are encoded together with a decoded image. The controller **170** may display a thumbnail list including a plurality of received thumbnail images on the display **180**.

The thumbnail list may be displayed on a part of the display **180** with an image displayed on the display **180**, that is, as a compact view, or the thumbnail list may be displayed in full screen on the display **180**. The thumbnail images of the thumbnail list may be updated sequentially.

The display **180** generates drive signals by converting a processed video signal, a processed data signal, an On Screen Display (OSD) signal, and a control signal received from the controller **170** or a video signal, a data signal, and a control signal received from the external device interface **130**.

The display **180** may be various types of displays such as a Plasma Display Panel (PDP), a Liquid Crystal Display (LCD), an Organic Light-Emitting Diode (OLED) display, and a flexible display. The display **180** may also be capable of displaying 3D images.

For 3D visualization, the display **180** may be configured into an auto-stereoscopic 3D display (glasses-free) or a traditional stereoscopic 3D display (with glasses).

Auto-stereoscopy is any method of displaying 3D images without any additional display, for example, special glasses on the part of a user. Thus, the display **180** displays 3D images on its own. Renticular and parallax bather are examples of auto-stereoscopic 3D imaging.

The traditional stereoscopy requires an additional display besides the display **180** in order to display 3D images. The additional display may be a Head Mount Display (HMD) type, a glasses type, etc.

As special 3D glasses, polarized glasses operate in a passive manner, whereas shutter glasses operate in an active manner. Also, HMD types may be categorized into passive ones and active ones.

A viewing device (not shown) may be 3D glasses that enable the user to view 3D images. The 3D glasses may be passive-type polarized glasses, active-type shutter glasses, or an HMD type.

The display **180** may also be a touch screen that can be used not only as an output device but also as an input device.

The audio output unit **185** may receive a processed audio signal from the controller **170** and output the received audio signal as voice.

The camera module (not shown) captures a user. The camera module may include, but not limited to, a single camera. When needed, the camera module may include a plurality of cameras. The camera module may be embedded above the display **180** in the image display apparatus **100**, or may be separately configured. Image information captured by the camera module may be provided to the controller **170**.

The controller **170** may sense a user's gesture from a captured image received from the camera module or from signals received from the sensor unit (not shown) alone or in combination.

The remote controller **200** transmits a user input to the user input interface **150**. For the transmission of a user input, the remote controller **200** may operate in conformance to various communication standards such as Bluetooth, RF, InfraRed (IR), Ultra WideBand (UWB), and ZigBee. In addition, the remote controller **200** may receive a video signal, audio signal and/or data signal from the user input interface **150** and output the received signal as an image or sound.

The above-described image display apparatus **100** may be a fixed or mobile digital broadcast receiver.

The block diagram of the image display apparatus **100** illustrated in FIG. **2** is an exemplary embodiment of the present invention. The image display apparatus **100** is shown in FIG. **2** as having a number of components in a given configuration. However, the image display apparatus **100** may include fewer components or more components than those shown in FIG. **1** in alternative embodiments. Also, two or more components of the image display apparatus **100** may be combined into a single component or a single component thereof may be separated into two more components in alternative embodiments. The functions of the components of the image display apparatus **100** as set forth herein are illustrative in nature and may be modified, for example, to meet the requirements of a given application.

Unlike the configuration illustrated in FIG. **2**, the image display apparatus **100** may be configured so as to receive and playback video content through the network interface **135** or the external device interface **130**, without the tuner unit **100** and the demodulator **120**.

The image display apparatus **100** is an example of image signal processing apparatus that processes a stored image or an input image. Other examples of the image signal processing apparatus include a set-top box without the display **180** and the audio output unit **185**, a DVD player, a Blu-ray player, a game console, and a computer. The set-top box will be described later with reference to FIGS. **3**A and **3**B.

FIGS. **3**A and **3**B are block diagrams of the set-top box according to embodiments of the present invention.

Referring to FIG. **3**A, the set-top box **250** may include a network interface **255**, a memory **258**, a signal processor **260**, a user input interface **263**, and an external device interface **265**.

The network interface **255** serves as an interface between the set-top box **250** and a wired/wireless network such as the Internet. The network interface **255** may transmit data to or

receive data from another user or another electronic device over a connected network or over another network linked to the connected network.

The memory **258** may store programs necessary for the signal processor **260** to process and control signals and may temporarily store a video, audio and/or data signal received from the external device interface **265** or the network interface **255**.

The signal processor **260** processes an input signal. For example, the signal processor **260** may demultiplex or decode an input video or audio signal. For signal processing, the signal processor **260** may include a video decoder or an audio decoder. The processed video or audio signal may be transmitted to the image display apparatus **100** through the external device interface **265**.

The user input interface **263** transmits a signal received from the user to the signal processor **260** or a signal received from the signal processor **260** to the user. For example, the user input interface **263** may receive various control signals such as a power on/off signal, an operation input signal, and a setting input signal through a local key (not shown) or the remote controller **200** and may output the control signals to the signal processor **260**.

The external device interface **265** serves as an interface between the set-top box **250** and an external device that is connected wirelessly or by wire, particularly the image display apparatus **100**, for signal transmission or reception. The external device interface **265** may also interface with an external device such as a game console, a camera, a camcorder, and a computer (e.g. a laptop computer), for data transmission or reception.

The set-top box **250** may further include a media input unit (not shown) for media playback. The media input unit may be a Blu-ray input unit, for example. That is, the set-top box **250** may include a Blu-ray player. After signal processing such as demultiplexing or decoding in the signal processor **260**, a media signal from a Blu-ray disk may be transmitted to the image display apparatus **100** through the external device interface **265** so as to be displayed on the image display apparatus **100**.

Referring to FIG. **3**B, the configuration of the set-top box **250** illustrated in FIG. **3**B is similar to that of the set-top box **250** illustrated in FIG. **3**A, except that a broadcasting receiver **272** resides in the set-top box **250**. The broadcast receiver **272** may include the tuner **270** and the demodulator **275**. Especially, a broadcast signal may be received through an antenna. The received broadcast signal may be input to the signal processor **260**.

The signal processor **260** operates in the same manner as described before with reference to FIG. **3**A and thus its description is not provided herein.

FIG. **4** is a block diagram of the controller illustrated in FIG. **2**.

Referring to FIG. **4**, the controller **170** may include a DEMUX **310**, a video processor **320**, a processor **330**, an On Screen Data (OSD) generator **340**, a mixer **345**, a Frame Rate Converter (FRC) **350**, and a formatter **360** according to an embodiment of the present invention. The controller **170** may further include an audio processor (not shown) and a data processor (not shown).

The DEMUX **310** demultiplexes an input stream. For example, the DEMUX **310** may demultiplex an MPEG-2 TS into a video signal, an audio signal, and a data signal. The input stream signal may be received from the tuner unit **110**, the demodulator **120** or the external device interface **135**.

The video processor **320** may process the demultiplexed video signal. For video signal processing, the video processor **320** may include a video decoder **325** and a scaler **335**.

The video decoder **325** decodes the demultiplexed video signal and the scaler **335** scales the resolution of the decoded video signal so that the video signal can be displayed on the display **180**.

The video decoder **325** may be provided with decoders that operate in conformance to various standards.

The decoded video signal processed by the video processor **320** may be a 2D video signal, a 3D video signal, or a combination of both.

For example, it may be determined whether an external video signal received from an external device or a video signal included in a broadcast signal received from the tuner unit **110** is a 2D signal, a 3D signal, or a combination of both. Accordingly, the controller **170**, particularly the video processor **320** processes the video signal and outputs a 2D video signal, a 3D video signal, or a combination of both.

The decoded video signal from the video processor **320** may have any of various available formats. For example, the decoded video signal may be a 3D video signal with a color image and a depth image or a 3D video signal with multi-viewpoint image signals. The multi-viewpoint image signals may include, for example, a left-eye image signal and a right-eye image signal.

For 3D visualization, available 3D formats include a side-by-side format, a top/bottom format, a frame sequential format, an interlaced format, and a checker box format. A left-eye image L and a right-eye image R are arranged side by side in the side by side format. The left-eye image L and the right-eye image R are stacked vertically in the top/bottom format, while they are arranged in time division in the frame sequential format. In the interlaced format, the left-eye image L and the right-eye image R alternate line by line. The left-eye image L and the right-eye image R are mixed on a box basis in the checker box format.

The processor **330** may provide overall control to the image display apparatus **100** or the controller **170**. For example, the processor **330** may control the tuner unit **110** to tune to RF broadcasting corresponding to a user-selected channel or a pre-stored channel.

The processor **330** may also control the image display apparatus **100** according to a user command received through the user input interface **150** or an internal program.

The processor **330** may control data transmission through the network interface **135** or the external device interface **130**.

The processor **330** may control operations of the DEMUX **310**, the video processor **320**, and the OSD generator **340** in the controller **170**.

The OSD generator **340** generates an OSD signal autonomously or according to a user input. For example, the OSD generator **340** may generate signals by which a variety of information is displayed as graphics or text on the display **180**, according to user input signals. The OSD signal may include various data such as a User Interface (UI), a variety of menus, widgets, icons, etc. Also, the OSD signal may include a 2D object and/or a 3D object.

Further, the OSD generator **340** may generate a pointer to be displayed on the display **180** based on a pointing signal received from the remote controller **200**. Especially, the pointer may be generated from a pointing signal processor (not shown), which may reside in the OSD generator **240**. Obviously, the pointing signal processor may be configured separately.

The mixer **345** may mix the decoded video signal processed by the video processor **320** with the OSD signal gen-

erated from the OSD generator **340**. The OSD signal and the decoded video signal each may include at least one of a 2D signal or a 3D signal. The mixed video signal is provided to the FRC **350**.

The FRC **350** may change the frame rate of the mixed video signal or simply output the mixed video signal without frame rate conversion.

The formatter **360** may arrange left-eye and right-eye video frames of the frame rate-converted 3D image and may also output a synchronization signal Vsync to open the left or right lens of the viewing device **195**.

The formatter **360** may separate a 2D video signal and a 3D video signal from the mixed video signal of the OSD signal and the decoded video signal received from the mixer **345**.

The formatter **360** may change the format of the 3D video signal, for example, to one of the afore-described 3D formats.

Meanwhile, the formatter **360** may convert a 2D video signal to a 3D video signal. For example, the formatter **360** may detect edges or a selectable object from the 2D video signal and generate a 3D video signal with an object based on the detected edges or the selectable object. As described before, the 3D video signal may be separated into left-eye and right-eye image signals L and R.

A 3D processor (not shown) may further be provided at the rear end of the formatter **360**, for processing a signal to exert 3D effects. For enhancing 3D effects, the 3D processor may adjust the brightness, tint, and color of a video signal. For example, the 3D processor may process a video signal so that a near area appears clear and a far area appears obscure. Meanwhile, the function of the 3D processor may be incorporated into the formatter **360** or the video processor **320**.

The audio processor (not shown) of the controller **170** may process the demultiplexed audio signal. For the audio signal processing, the audio processor may have a plurality of decoders.

The audio processor of the controller **170** may also adjust the bass, treble, and volume of the audio signal.

The data processor (not shown) of the controller **170** may process the data signal obtained by demultiplexing the input stream signal. For example, if the demultiplexed data signal is a coded data signal, the data processor may decode the coded data signal. The coded data signal may be an EPG which includes broadcast information specifying the start time, end time, etc. of scheduled broadcast TV or radio programs.

While it is shown in FIG. **4** that the mixer **345** mixes signals received from the OSD generator **340** and the video processor **320** and then the formatter **360** performs 3D processing on the mixed signal, to which the present invention is not limited, the mixer **345** may be positioned after the formatter **360**. Thus the formatter **360** may perform 3D processing on a signal received from the video processor **320**, the OSD generator **340** may generate an OSD signal and subject the OSD signal to 3D processing, and then the mixer **345** may mix the processed 3D signals received from the formatter **360** and the OSD generator **340**.

The block diagram of the image display apparatus **100** illustrated in FIG. **4** is purely exemplary. Depending upon the specifications of the image display apparatus **100** in actual implementation, the components of the image display apparatus **100** may be combined or omitted or new components may be added. That is, two or more components are incorporated into one component or one component may be configured as separate components, as needed.

Especially, the FRC **350** and the formatter **360** may be configured separately outside the controller **170**.

FIG. **5** illustrates a method for controlling the remote controller illustrated in FIG. **2**.

FIG. **5**(*a*) illustrates a pointer **205** representing movement of the remote controller **200** displayed on the display **180**.

The user may move or rotate the remote controller **200** up and down, side to side (FIG. **5**(*b*)), and back and forth (FIG. **5**(*c*)). Since the pointer **205** moves in accordance with the movement of the remote controller **200** in 3D space, the remote controller **200** may be referred to as a pointing device.

Referring to FIG. **5**(*b*), if the user moves the remote controller **200** to the left, the pointer **205** also moves to the left on the display **180**.

A sensor of the remote controller **200** detects the movement of the remote controller **200** and transmits motion information corresponding to the result of the detection to the image display apparatus **100**. Then, the image display apparatus **100** determines the movement of the remote controller **200** based on the motion information received from the remote controller **200**, and calculates the coordinates of a target point to which the pointer **205** should be shifted in accordance with the movement of the remote controller **200** based on the result of the determination. The image display apparatus **100** then displays the pointer **205** at the calculated coordinates.

Referring to FIG. **5**(*c*), while pressing a predetermined button of the remote controller **200**, the user moves the remote controller **200** away from the display **180**. Then, a selected area corresponding to the pointer **205** may be zoomed in and enlarged on the display **180**. On the contrary, if the user moves the remote controller **200** toward the display **180**, the selection area corresponding to the pointer **205** is zoomed out and thus contracted on the display **180**. The opposite case is also possible. That is, when the remote controller **200** recedes from the display **180**, the selection area may be zoomed out and when the remote controller **200** approaches the display **180**, the selection area may be zoomed in.

With the predetermined button pressed on the remote controller **200**, the up, down, left and right movements of the remote controller **200** may be ignored. That is, when the remote controller **200** recedes from or advances toward the display **180**, only the back and forth movements of the remote controller **200** may be sensed, while the up, down, left and right movements of the remote controller **200** may be ignored. Unless the predetermined button is pressed in the remote controller **200**, the pointer **205** may move in accordance with the up, down, left or right movement of the remote controller **200**.

The speed and direction of the pointer **205** may correspond to the speed and direction of the remote controller **200**.

FIG. **6** is a block diagram of the remote controller illustrated in FIG. **2**.

Referring to FIG. **6**, the remote controller **200** may include a wireless communication module **420**, a user input unit **430**, a sensor unit **440**, an output unit **450**, a power supply **460**, a memory **470**, and a controller **480**.

The wireless communication module **405** transmits signals to and receives signals from the image display apparatus **100**.

In the embodiment of the present invention, the wireless communication module **420** may include an RF module **421** for transmitting RF signals to and/or receiving RF signals from the image display apparatus **100** according to an RF communication standard. The wireless communication module **420** may also include an IR module **423** for transmitting IR signals to and/or receiving IR signals from the image display apparatus **100** according to an IR communication standard.

The remote controller **200** may transmit motion information regarding its movement to the image display apparatus **100** through the RF module **421**.

The remote controller **200** may also receive signals from the image display apparatus **100** through the RF module **421**. The remote controller **200** may transmit commands, such as a power on/off command, a channel switching command, or a sound volume change command, to the image display apparatus **100** through the IR module **423**, as needed.

The user input unit **430** may include a keypad, a plurality of buttons, a touch pad, and/or a touch screen. The user may enter commands to the image display apparatus **100** by manipulating the user input unit **430**. If the user input unit **230** includes a plurality of hard-key buttons, the user may input various commands to the image display apparatus **100** by pressing the hard-key buttons. Alternatively or additionally, if the user input unit **430** includes a touch screen displaying a plurality of soft keys, the user may input various commands to the image display apparatus **100** by touching the soft keys. The user input unit **430** may also include various input tools other than those set forth herein, such as a scroll key and/or a jog key, which should not be construed as limiting the present invention.

The sensor unit **440** may include a gyro sensor **441** and/or an acceleration sensor **443**. The gyro sensor **441** may sense the movement of the remote controller **200**

For example, the gyro sensor **441** may sense the movement of the remote controller **200**, for example, in X-, Y-, and Z-axis directions, and the acceleration sensor **443** may sense the moving speed of the remote controller **200**. The sensor unit **440** may further include a distance sensor for sensing the distance between the remote controller **200** and the display **180**.

The output unit **450** may output a video and/or audio signal corresponding to a manipulation of the user input unit **430** or a signal transmitted by the image display apparatus **100**. The user may easily identify whether the user input unit **430** has been manipulated or whether the image display apparatus **100** has been controlled based on the video and/or audio signal output from the output unit **450**.

The output unit **450** may include a Light Emitting Diode (LED) module **451** which is turned on or off whenever the user input unit **430** is manipulated or whenever a signal is received from or transmitted to the image display apparatus **100** through the wireless communication module **420**, a vibration module **453** which generates vibrations, an audio output module **455** which outputs audio data, and a display module **457** which outputs an image.

The power supply **460** supplies power to the remote controller **200**. If the remote controller **200** is kept stationary for a predetermined time or longer, the power supply **460** may, for example, reduce or cut off supply of power to the remote controller **200** in order to save power. The power supply **460** may resume supply of power if a specific key on the remote controller **200** is manipulated.

The memory **470** may store various programs and application data for controlling or operating the remote controller **200**. The remote controller **200** may wirelessly transmit signals to and/or receive signals from the image display apparatus **100** in a predetermined frequency band through the RF module **421**. The controller **480** of the remote controller **200** may store information regarding the frequency band used for the remote controller **200** to wirelessly transmit signals to and/or wirelessly receive signals from the paired image display apparatus **100** in the memory **470** and may then refer to this information for use at a later time.

The controller **480** provides overall control to the remote controller **200**. For example, the controller **280** may transmit a signal corresponding to a key manipulation detected from the user input unit **430** or a signal corresponding to motion of the remote controller **200**, as sensed by the sensor unit **440**, to the image display apparatus **100** through the wireless communication module **420**.

The user input interface **150** of the image display apparatus **100** may include a wireless communication module **151** which wirelessly transmits signals to and/or wirelessly receives signals from the remote controller **200**, and a coordinate calculator **415** which calculates coordinates representing the position of the remote controller **200** on the display screen, which is to be moved in accordance with the movement of the remote controller **200**.

The user input interface **150** may wirelessly transmit RF signals to and/or wirelessly receive RF signals from the remote controller **200** through the RF module **412**. In addition, the user input interface **150** may wirelessly receive IR signals from the remote controller **200** through the IR module **413** according to the IR communication standard.

The coordinate calculator **415** may receive motion information regarding the movement of the remote controller **200** through the wireless communication module **151** and may calculate coordinates (x, y) representing the position of the pointer **202** on a screen of the display **180** by correcting the motion information for possible errors such as user hand tremor.

A signal received in the image display apparatus **100** from the remote controller **200** through the interface **150** may be transmitted to the controller **170**. Then, the controller **170** may acquire information regarding the movement of the remote controller **200** and information regarding a key manipulation detected from the remote controller **200** from the signal received from the user input interface **150**, and may control the image display apparatus **100** based on the acquired information.

In another example, the remote controller **200** may calculate the coordinates of a position to which the pointer **205** is to be shifted in correspondence with its movement and output the coordinates to the user input interface **150** of the image display apparatus **100**. In this case, the user input interface **150** may transmit information about the pointer coordinates which was not corrected for possible errors such as user hand tremor to the controller **170**.

In a further example, unlike the configuration of the remote controller **200** illustrated in FIG. **6**, the coordinate calculator **415** may reside in the controller **170**, instead of the user input interface **150**.

FIG. **7** is a block diagram of the server illustrated in FIG. **1**.

Referring to FIG. **7**, the server **500** may include a network interface **730**, a memory **740**, and a processor **720**.

The network interface **730** may receive channel number information and channel name information (e.g. MBS, CBB, KBB, NCC, etc.) from one or more image display apparatuses or channel map information from the image display apparatuses.

The network interface **730** may further receive information about program names (e.g. Oh! Lady, ABC news, DR. OZ, etc.) from the image display apparatuses in addition to the channel name information.

The memory **740** preserves a plurality of channel maps. The channel maps may include a cable broadcasting (terrestrial and analog) channel map, a terrestrial analog broadcasting channel map, a satellite broadcasting channel map, an IPTV channel map, etc. Cable broadcasting channel maps may be distinguished on a region basis or on a cable broadcasting service type basis.

The processor **720** may select channel maps from among the plurality of channel maps stored in the memory **740** based on the channel map information or the channel number and

channel name information received from the image display apparatuses and may control transmission of information about the selected channel maps to the respective image display apparatuses.

In the absence of a channel map corresponding to each of the image display apparatuses **100***a* to **100***n* in the server **500**, the processor **720** may control reception and selection of the channel map from another server.

In the case where a channel map corresponding to each of the image display apparatuses **100***a* to **100***n* is not present in the server **500** and the channel map is not available from another server, when a specific number of channel maps are the same from among channel maps received from the image display apparatuses **100***a* to **100***n*, the server **500** may control the same channel map to be stored as a new channel map in the memory **740**.

Meanwhile, the processor **720** may generate real-time viewer rating information using real-time broadcasting information or broadcast images received from a plurality of image display apparatuses. The real-time viewer rating information may include information about a channel share, the numbers of channel viewers, a program share of a specific channel, and the number of viewers for the specific channel. Besides, the real-time viewer rating information may include real-time channel search information or real-time program search information.

The processor **720** may determine whether images including broadcasting information received from a plurality of image display apparatuses are real-time broadcast images by comparing the received images with real-time broadcast images received through a network.

If the received images are real-time broadcast images, the processor **720** may extract broadcasting information such as channel information and program information from the broadcast images and generate real-time viewer rating information based on the extracted broadcasting information.

The network interface **730** may transmit the selected channel map or channel number and channel name information included in the selected channel map to each image display apparatus.

In addition, the network interface **730** may transmit the real-time viewer rating information to at least one of the plurality of image display apparatuses. It is preferred to transmit the real-time viewer rating information to all image display apparatuses that have transmitted broadcasting information or images including the broadcasting information.

FIG. **8** is a flowchart illustrating a method for operating the image display apparatus according to an embodiment of the present invention, FIG. **9** is a flowchart illustrating a method for operating the server according to an embodiment of the present invention, FIG. **10** is a diagram illustrating a signal flow for performing an operation between the image display apparatus and the server according to an embodiment of the present invention, and FIGS. **11**A to **16**E are views referred to for describing various examples of the method for operating the image display apparatus illustrated in FIG. **8** or the method for operating the server illustrated in FIG. **9**.

First of all, the image display apparatus **100** enters channel scan mode (S**810**). The image display apparatus **100** may enter the channel scan mode automatically or in response to reception of a user input. For instance, the channel scan mode may be automatic or manual.

FIG. **11**A is an exemplary view illustrating automatic channel scan mode. Referring to FIG. **11**A, when the image display apparatus **100** enters the automatic channel scan mode in response to reception of a user input, it scans channels automatically. An object **1120** indicating automatic channel scan may be displayed as illustrated in FIG. **11**A.

The object **1120** indicating automatic channel scan may be displayed together with a broadcast image **1110** of CH **9** that the user is viewing. The object **1120** may be transparent so that the user can view the on-going broadcast image **1110**.

Meanwhile, the controller **170** controls the image display apparatus **100** to be set to the automatic channel scan mode, upon receipt of a user input requesting the automatic channel scan mode. That is, the controller **170** controls channel scanning, while switching from one channel to another in regard to input broadcast signals by controlling the broadcasting receiver **105**.

Subsequently, the image display apparatus **100** receives a broadcast signal of a detected broadcast channel (S**815**) and determines whether channel number information and channel name information is included in the broadcast signal (S**820**). If the broadcast signal does not include the channel number information or the channel name information, the image display apparatus **100** stores a broadcast image included in the broadcast signal (S**822**). On the other hand, if the broadcast signal includes the channel number information and the channel name information, the image display apparatus **100** stores the channel number information and channel name information (S**823**).

The image display apparatus **100** receives a detected broadcast signal through the broadcasting receiver **105**.

For example, if broadcast signals are received through the antenna, the tuner unit **110** of the broadcasting receiver **105** may sequentially receive broadcast images of a plurality of channels, while switching from one channel to another. The controller **170** may control channel switching through the tuner unit **110**. The broadcast signals received through the tuner unit **110** are input to the controller **170** through the demodulator **120**.

If broadcast signals are received through the set-top box **250**, that is, through the external device interface **130**, the controller **170** may control reception of broadcast images of a plurality of channels at the set-top box **250**. For instance, the controller **170** may transmit a control signal for automatic channel scan to the set-top box **250**. The broadcast signals received through the external device interface **130** are input to the controller **170**.

Upon receipt of a broadcast signal, the controller **170** demultiplexes the broadcast signal at the DEMUX **310** and determines whether a demultiplexed data signal includes channel number information and channel name information. For example, in the case of an ATSC digital broadcast signal, channel number information and channel name information may be included in Program and System Information Protocol (PSIP). In the case of a DVB digital broadcast signal, channel number information and channel name information may be included in System Information (SI).

If the broadcast signal is a digital broadcast signal received through the antenna, the controller **170** extracts channel number information and channel name information from the broadcast signal and stores the extracted channel number information and channel name information in the memory **140**. The channel number information and channel name information may be stored in the form of a channel map in the memory **140**.

FIG. **11**B is an exemplary view illustrating reception of a first broadcast signal Sa on CH **9** in the image display apparatus **100**. The display **180** of the image display apparatus **100** may display a first broadcast image **1130** corresponding to the received first broadcast signal Sa. On the assumption that CH **9** is a digital broadcast channel, when a broadcast signal is

received on CH **9** through the antenna, the memory **140** may store channel number information, 9 and channel name information, KBS1 in a channel map **1141** as done in step S**823**.

If the received broadcast signal is a digital broadcast signal received through the set-top box **250**, the broadcast signal may include channel number information and channel name information. Then the controller **170** may extract the channel number information and channel name information from the broadcast signal and control storage of the channel number information and channel name information in a channel map in the memory **140**.

On the contrary, if the received broadcast signal is an analog broadcast signal, the broadcast signal may include only channel number information without channel name information. In this case, the controller **170** may subject the received broadcast signal to demultiplexing and video signal processing and may control storage of the processed broadcast image in the memory **140**. The stored broadcast image may be a still image. The broadcast image is preferably stored along with the channel number information.

If the broadcast signal is a digital broadcast signal received through the set-top box **250**, the broadcast signal may not include channel number information or channel name information. For example, a digital broadcast signal provided by a cable system operator may not include channel number information or channel name information. In this case, step S**822** is performed as is done when an analog broadcast signal is received. That is, the controller **170** may process the received broadcast signal by demultiplexing and video signal processing and may control storage of the processed broadcast image.

FIG. **11**D is an exemplary view illustrating reception of a third broadcast signal Sc on CH **20** in the image display apparatus **100**. The display **180** of the image display apparatus **100** may display a third broadcast image **1134** corresponding to the third broadcast signal Sc. On the assumption that CH **20** broadcasts an analog signal, the memory **140** may store a video frame **1154** of the third broadcast image **1134** as done in step S**822**. Meanwhile, the memory **140** may further store channel number information, **20** in a channel map **1144**.

The image display apparatus **100** determines whether the channel scan has been completed (S**824**). If the channel scan still runs, the next channel is scanned (S**826**). Steps S**815** through S**824** are repeated for a broadcast signal of the next detected broadcast signal.

FIG. **11**C is an exemplary view illustrating reception of a second broadcast signal Sb on CH **11** in the image display apparatus **100**. The display **180** of the image display apparatus **100** may display a second broadcast image **1132** corresponding to the second broadcast signal Sb. On the assumption that CH **11** broadcasts a digital signal, when a broadcast signal of CH **11** is received through the antenna, the memory **140** may store channel number information, **11** and channel name information, MBC in a channel map **1142** in the memory **140** as done in step S**823**.

FIG. **11**E is an exemplary view illustrating reception of a sixth broadcast signal Sf on CH **23** in the image display apparatus **100**. The display **180** of the image display apparatus **100** may display a sixth broadcast image **1137** corresponding to the sixth broadcast signal Sf. On the assumption that CH **23** broadcasts an analog signal, the memory **140** may store a video frame **1157** of the sixth broadcast image **1137** as done in step S**822**. Meanwhile, the memory **140** may further store channel number information, **22** in a channel map **1147**.

Upon completion of the channel scanning, the image display apparatus **100** determines whether any stored broadcast image includes a channel name image (S**840**). In the presence of any stored broadcast image including a channel name image, the image display apparatus **100** extracts the channel name image and acquires the channel name of a channel that has broadcast the broadcast image (S**850**) and stores channel number information and channel name information associated with the channel in a channel map (S**855**).

When the channel scanning is completed in the channel scan mode, the controller **170** generates the channel map using the pre-stored broadcast images.

Specifically, the controller **170** determines whether an image indicating a channel name exists in a broadcast image stored in the memory **140**.

FIG. **12**A is an exemplary view illustrating determination of a channel name by detecting a log indicating the channel name in an image **1155** of CH **21** stored in the memory **140**.

The controller **170** may invoke the broadcast image **1155** of CH **21** and detect a log. In general, the logo indicating the channel name is displayed at the top right corner, the bottom right corner, or the top left corner of the broadcast image **1155**. Thus, the controller **170** extracts the displayed area of the log and detects the channel name by comparing the logo or text included in the extracted area with pre-stored channel name information.

As noted from (a) of FIG. **12**A, the controller **170** may extract a logo **1212** from the top right corner of the broadcast image **1155** and detect a channel name **1214**, tvN from the logo **1212**.

As illustrated in (b) of FIG. **12**A, the channel name **121**, tvN may be stored along with the channel number, **21** in a channel map **1240** in the memory **140**.

FIG. **12**B is an exemplary view illustrating determination of a channel name by detecting a log indicating the channel name in an image **1153** of CH **23** stored in the memory **140**.

The controller **170** may invoke the broadcast image **1153** of CH **23** and detect a log.

As noted from (a) of FIG. **12**B, the controller **170** may extract a logo **1222** from the top right corner of the broadcast image **1153** and detect a channel name **1224**, NewY from the logo **1222**.

As illustrated in (b) of FIG. **12**B, the channel name **1224**, NewY may be stored along with the channel number, **23** in a channel map **1242** in the memory **140**.

In the absence of a broadcast image including a channel-name image in step S**840**, the image display apparatus **100** transmits to the server **500** the channel number information and channel name information that have been determined until then (S**870**). Step S**870** of FIG. **8** corresponds to step S**970** of FIG. **9** and step S**1070** of FIG. **10**.

In the absence of a broadcast image including a channel-name image for a channel, the controller **170** cannot determine the name of the channel. Therefore, the controller **170** may control transmission of the channel number information and channel name information that have been detected so far to the server **500**.

For example, the controller **170** may control transmission of an incomplete channel map **1242** that has been created so far to the server **500** through the network interface **135** as illustrated in FIG. **12**C.

Referring to FIG. **12**C, the channel map **1242** lists the channel names of digital broadcast channels, CH **9** and CH **11** and the channel names of analog broadcast channels, CH **21** and CH **23**, with the channel names of analog broadcast channels CH **20** and CH **22** left empty.

The server **500** receives the determined channel number information and channel name information from the image display apparatus **100** (S**970**). The server **500** receives the determined channel number information and channel name

information from the image display apparatus **100** through the network interface **730**. Alternatively, the network interface **730** may receive the incomplete channel map from the image display apparatus **100**. Step S**970** of FIG. **9** corresponds to step S**870** of FIG. **8** and step S**1070** of FIG. **10**.

Subsequently, the server **500** selects a channel map matching to the received channel number information and the channel name information (S**973**). The processor **720** of the server **500** selects a channel map matching to the channel number information and channel name information received from the image display apparatus **100** from among a plurality of channel maps stored in the memory **740**.

Step S**973** of FIG. **9** corresponds to step S**1073** of FIG. **10**.

For example, since channel names are filled for some channels (i.e. CH **9**, CH **11**, CH **21**, and CH **23**) in the channel map **1242** illustrated in FIG. **12**C, a matching complete channel map may be selected based on the channel numbers (i.e. CH **9**, CH **11**, CH **21**, and CH **23**) and their channel names (i.e. KBS1, MBC, tvN, and New Y).

The server **500** transmits information about the selected channel map to the image display apparatus **100** (S**975**). The network interface **730** of the server **500** transmits the information about the selected channel map to the image display apparatus **100**. Step S**975** of FIG. **9** corresponds to step S**875** of FIG. **8** and step S**1075** of FIG. **10**.

For example, the server **500** may transmit a selected channel map **1244** to the image display apparatus **100** through the network interface **135**, as illustrated in FIG. **12**D. Alternatively or additionally, the network interface **135** may transmit channel name information, KBC and SBC for the broadcast channels, CH **20** and CH **22** for which channel names were left empty in the channel map **1242** illustrated in FIG. **12**C.

Then the image display apparatus **100** updates the channel map with the received channel map information (S**880**). Step S**880** of FIG. **8** corresponds to step S**1080** of FIG. **10**.

The controller **170** may complete the incomplete channel map using the channel map information received through the network interface **135**.

Referring to FIG. **12**D, upon receipt of the channel map **1244** selected by the server **500**, the image display apparatus **100** may replace its incomplete channel map with the received channel map **1244**. That is, the incomplete channel map may be updated to the received channel map **1244**.

On the other hand, upon receipt of the channel name information, KBC and SBC for the broadcast channels CH **20** and CH **22** whose channel names are yet to be determined in the channel map **1242** illustrated in FIG. **12**C, the image display apparatus **100** may update the incomplete channel map to the channel map **1244** using the received channel name information.

Therefore, the image display apparatus **100** can readily acquire the channel names, KBC and SBC of the channels CH **20** and CH **22** whose channel names were not determined.

A step of determining whether the channel map has been completed, **5890** may follow step S**855** or S**880**. If the channel map remains to be completed, the procedure returns to step S**840**.

FIG. **13**A is an exemplary view illustrating transmission of an incomplete channel map **1340**, or location information or network information S**1** about the image display apparatus **100** from the image display apparatus **100** to the server **500**.

The controller **170** of the image display apparatus **100** may control transmission of the incomplete channel map **1340** or the location information or network information S**1** about the image display apparatus **100** through the network interface **135**.

The location information or network information S**1** may include the IP address or region information of the image display apparatus **100**. The server **500** may readily identify a broadcasting service provider to which the image display apparatus **100** subscribed to, using the location information or network information S**1**.

The channel map **1340** has the channel names, OCN, Channel CGV, SUPER ACTION, and SCREEN of CH **25**, CH **26**, CH **32** and CH **29**, with the channel name of CH **52** left empty.

FIG. **13**B is an exemplary view illustrating selection of a channel map in the server **500**.

The processor **720** of the server **500** may use the incomplete channel map **1340** or the location information or network information S**1** about the image display apparatus **100** received through the network interface **730**, as indicated by (a) of FIG. **13**B.

That is, the processor **720** may filter a plurality of channel maps **1350** stored in the memory **740** using the incomplete channel map **1340** or the location information or network information S**1**, as indicated by (b) of FIG. **13**B.

For example, if the location information or network information S**1** indicates a specific region (e.g. Seochogu in Seoul, Korea), the processor **720** of the server **500** may search only a list **1360** of broadcasting service providers that provide broadcasting services to the specific region among a list **1350** of plural service providers stored in the memory **740**, as indicated by (c) of FIG. **13**B.

(c) of FIG. **13**B illustrates exemplary extraction of three broadcasting service providers **1362**, **1364**, and **1366**.

The processor **720** of the server **500** compares the received incomplete channel map **1340** with channel maps associated with the three broadcasting service providers **1362**, **1364**, and **1366** and then selects a channel map matching to the incomplete channel map **1340**.

FIG. **13**C is an exemplary view illustrating comparison between the received incomplete channel map **1340** with channel maps **1372**, **1374**, and **1376** associated with the three broadcasting service providers **1362**, **1364**, and **1366**. As noted from FIG. **13**C, the first channel map **1372** matches to the incomplete channel map **1340**. Thus the channel name YSS of CH **52** is determined from the first channel map **1372**.

The processor **720** of the server **500** may control transmission of the selected channel map **1372** to the image display apparatus **100**.

FIG. **13**D is an exemplary view illustrating transmission of information about the selected channel map **1372** from the server **500**. The channel map information may include information about the broadcasting service provider **1343** that provides broadcasting service to the image display apparatus **100** in addition to channel number information and channel name information. The broadcasting service provider information may be transmitted separately from the channel map information.

Meanwhile, the channel map information may include information about a broadcasting service type received from the broadcasting service provider in addition to the channel number information and the channel name information.

FIG. **13**E is an exemplary view illustrating different channel maps **1382**, **1384**, and **1386** for different broadcasting service types provided by the same broadcasting service provider. Three-level channel maps are defined: the economical-type channel map **1382**, the basic-type channel map **1384**, and the premium-type channel map **1386**. The processor **720** of the server **500** may compare the incomplete channel map received from the image display apparatus **100** with the chan-

nel maps **1382**, **1384**, and **1386** classified by broadcasting service type and select the channel map **1386** matching to the incomplete channel map.

FIG. **13**F is an exemplary view illustrating transmission of channel map information associated with the selected channel map **1386** from the server **500**. In addition to channel number information and channel name information, the channel map information may include information **1344** (i.e. premium) about a broadcasting service type provided to the image display apparatus **100**. The broadcasting service type information may be transmitted separately from the channel map information.

FIG. **14**A is an exemplary view illustrating reception of information about incomplete channel maps **1440***a* to **1440***c* from a plurality of image display apparatuses **100***a* to **100***n* at the server **500**.

The server **500** may select matching channel maps by comparing the incomplete channels maps **1440***a* to **1440***c* received from the image display apparatuses **100***a* to **100***n* with channel maps **1450** stored in the server **500**.

In FIG. **14**A, the server **500** is shown as selecting a matching channel map for the first image display apparatus **100***a* by comparing the channel map **1440***a* received from the first image display apparatus **100***a* with the stored channel maps **1450**, by way of example.

The server **500** may transmit information about the selected channel maps to the respective image display apparatuses **100***a* to **100***n*.

FIG. **14**B is an exemplary view illustrating reception of information about the same incomplete channel map **1440***a* from the plurality of image display apparatuses **100***a* to **100***n* at the server **500**.

The server **500** may select a matching channel map by comparing the incomplete channels map **1440***a* received from the image display apparatuses **100***a* to **100***n* with the channel maps **1450** stored in the server **500**.

It may occur that none of the stored channel maps **1450** match to the incomplete channel map **1440***a*.

In this case, if a specific number of channel maps are identical among the channel maps received from the image display apparatuses **100***a* to **100***n*, the server **500** may store the identical channel map as a new channel map. Herein, it is preferred to complete the identical incomplete channel map using the channel maps received from the image display apparatuses **100***a* to **100***n* and then store the completed channel map.

FIG. **14**C is an exemplary view illustrating adding the channel map **1440***a* to the existing channel maps **1450** and storing the resulting updated channel maps **1460**. Preferably, the channel map **1440***a* is completed by filling all channel names and then added.

The image display apparatus **100** may store a completed channel map by exchanging data, particularly, channel map information with the server **500**.

Upon receipt of a user input or upon completion of the channel map, the image display apparatus **100** may display an object **1520** representing the channel map on the display **180**, as illustrated in FIG. **15**. The channel map object **1520** may be displayed together with a broadcast image **1510**. Therefore, the user can readily identify channel names corresponding to channel numbers.

The image display apparatus **100** may also display real-time viewer rating information by exchanging data with the server **500**.

FIG. **16**A is an exemplary view illustrating transmission of broadcasting information **1630** or an image **1625** including the broadcasting information from the image display apparatus **100** to the server **500**.

While the broadcasting information **1630** is shown in FIG. **16**A as transmitted in the form of an image, this is purely exemplary. Thus, the broadcasting information **1630** may be text data. For instance, the broadcasting information **1630** may be text data indicating "MBS HD" or/and "Infinite Challenge".

While the image **1625** including the broadcasting information is shown as a whole broadcast image, it may include only a broadcasting information part. That is, reference numeral **1630** denotes an image including the broadcasting information.

FIG. **16**B is an exemplary view illustrating determination made at the server **500** as to whether the image **1625** received from the image display apparatus **100** is a real-time broadcast by comparing the image **1625** with real-time broadcast images **1640** received through a network.

The server **500** may receive real-time broadcast images **1640***a* to **1640***d* through the network and store them in the memory **740**.

The processor **720** of the server **500** compares the image **1625** received from the image display apparatus **100** with the real-time broadcast images **1640***a* to **1640***d*. If the image **1625** is identical to any of the real-time broadcast images **1640***a* to **1640***d*, the processor **720** determines that the image **1625** is a real-time broadcast image.

To perform the operation, the processor **720** may use a video pattern comparison algorithm.

In FIG. **16**B, the image **1625** is shown as identical to the second real-time broadcast image **1640***b*, by way of example.

FIG. **16**C is an exemplary view illustrating generation of real-time viewer rating information **1650** at the server **500**.

The real-time viewer rating information **1650** may be generated, taking into account broadcasting information or broadcast images that the image display apparatus **100** receives through both the set-top box **250** and the broadcasting receiver **105**.

In FIG. **16**C, the real-time viewer rating information **1650** is specified as the numbers of viewers.

FIG. **16**D is an exemplary view illustrating transmission of real-time viewer rating information **1655** from the server **500** to the image display apparatus **100**.

The image display apparatus **100** may receive the real-time viewer rating information **1655** from the server **500** through the network interface **135**.

FIG. **16**E is an exemplary view illustrating display of a real-time viewer rating object **1665** along with a broadcast image **1660** on the image display apparatus **100**.

The controller **170** of the image display apparatus **100** may generate the real-time viewer rating object **1665** based on the real-time viewer rating information **1655** received from the server **500** and may control display of the real-time viewer rating object **1665** on the display **180**.

In FIG. **16**E, broadcasting information **1620** including channel information, 'MBS HD' and program information, 'Infinite Challenge' is also displayed, by way of example.

Therefore, the user can readily view real-time viewer rating information. Since the user can switch to or view another broadcast channel or broadcast program according to viewer ratings, user convenience can be increased.

Meanwhile, the image display apparatus **100** may determine whether a received broadcast signal is a real-time broadcast signal.

For example, the image display apparatus **100** may receive the real-time broadcast images **1640** through the network, as illustrated in FIG. **16**B. Then the image display apparatus **100** may determine whether the image **1625** received from the set-top box **250** is a real-time broadcast image by comparing the image **1625** with the real-time broadcast images **1640**.

If the image **1625** is identical to any of the real-time broadcast images **1640**, the image display apparatus **100** may determine that the image **1625** is a real-time broadcast image and extract real-time broadcasting information from the image **1625**.

As described before, when the same text, figure, or symbol is displayed for a predetermined time in a specific area of a real-time broadcast image, for example, at a corner of the real-time broadcast image, the image display apparatus **100** may extract the specific area, considering that the specific area includes broadcasting information.

Then the image display apparatus **100** may extract real-time channel information, 'MBS BD' or program information, 'Infinite Challenge' from the specific area and may transmit the real-time broadcasting information to the server **500**. The image display apparatus **100** may attach a tag 'live' to the real-time broadcasting information.

Even though the received broadcast image is not a real-time broadcast image, the image display apparatus **100** may extract broadcasting information in the afore-described method. The image display apparatus **100** may transmit recorded broadcasting information, not live broadcasting information to the server **500**. The image display apparatus **100** may attach a tag 'record' to the recorded broadcasting information.

FIG. **17** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention.

The operation method illustrated in FIG. **17** is similar to that illustrated in FIG. **8**, except that a channel map is generated during channel scanning rather than the channel map is generated after channel scanning is completed. Accordingly, the step of storing a broadcast image (S**822**) and the step of storing a channel number and a channel name (S**823**) described before with reference to FIG. **8** may not be performed herein. The following description is given, centering on the difference from the operation method of FIG. **8**.

Steps S**1710**, S**1715**, and S**1720** correspond to steps S**810**, S**815**, and S**820** of FIG. **8**, respectively and their description is not provided herein.

Steps S**1740** through S**1755** are performed in the same manner as steps S**840** through S**855** of FIG. **8**, except that the steps are repeated during scanning each channel, not after channel scanning is completed as done in FIG. **8**.

Steps S**1770**, S**1775** and S**1780** correspond to steps S**870**, S**875** and S**880** of FIG. **8**.

The image display apparatus **100** determines whether channel scanning has been completed (S**1760**). Upon completion of the channel scanning, the image display apparatus **100** scans the next channel (S**1765**). Then the procedure returns to step S**1715**.

FIG. **18** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention, FIG. **19** is a flowchart illustrating a method for operating the remote controller according to another embodiment of the present invention, FIG. **20** is a flowchart illustrating a method for operating the server according to another embodiment of the present invention,

FIG. **21** is a diagram illustrating a signal flow for performing an operation among the image display apparatus, the server, the remote controller, and the set-top box according to another embodiment of the present invention, and FIGS. **22** to **24** are views referred to for describing various examples of the operating method illustrated in FIG. **18**, **19** or **20**.

First of all, the image display apparatus **100** receives a broadcast signal from the set-top box **250** (S**1805**). Step S**1805** corresponds to step S**2105** of FIG. **21**.

The image display apparatus **100** may receive a cable broadcast signal, a satellite broadcast signal, a terrestrial broadcast signal, or an IPTV broadcast signal through the set-top box **250**. The received broadcast signal is provided to the controller **170** through the external device interface **130**.

The controller **170** processes the received broadcast signal, for example, by demultiplexing, decoding, etc. thereby converting the broadcast signal to a signal that can be displayed on the display **180**.

The controller **170** controls display of a broadcast image corresponding to the broadcast signal received from the set-top box **250** on the display **180**.

Then the image display apparatus **100** determines whether an image indicating a channel name or a program name exists in the broadcast image of the broadcast signal (S**1810**). In the presence of an image indicating a channel name or a program name in the broadcast image of the broadcast signal, the image display apparatus **100** extracts the image indicating a channel name or a program name (S**1820**) and transmits the extracted image to the server **500** (S**1830**). Steps S**1810** and S**1820** correspond to steps S**2110** and S**2120** of FIG. **21**, respectively. Step S**1830** corresponds to step S**2030** of FIG. **20** and S**2130** of FIG. **21**.

The controller **170** determines the existence of an image indicating a channel name or a program name in the broadcast image of the broadcast signal received from the set-top box **250**.

Specifically, the controller **170** may detect a log using a logo image indicating the name of a broadcast channel or a logo image indicating the name of a specific program.

In general, the logo image indicating the channel name or the logo image indicating the program name is displayed at the top right corner, the bottom right corner, or the top left corner of the broadcast image. Thus, the controller **170** extracts the displayed area of the logo image and detects the logo or text from the area.

The image display apparatus **100** may transmit the detected image indicating the channel name or program name to the server **500** through the network interface **135**.

The server **500** may receive the image indicating the channel name or program name of the broadcast image displayed on the image display apparatus **100** through the network interface **730**. The image may be provided to the processor **720** of the server **500**.

Then the server **500** extracts real-time broadcasting information based on the received image and a real-time broadcast image (S**2033**) and generates real-time viewer rating information (S**2036**). The server **500** transmits the real-time viewer rating information to at least one of a plurality of image display apparatuses (S**2040**). Steps S**2033** and S**2036** correspond to step S**2133** and S**2136** of FIG. **21** and step S**2040** corresponds to step S**1840** of FIG. **18** and step S**2140** of FIG. **21**.

Specifically, the processor **720** of the server **500** may generate real-time viewer rating information using real-time broadcasting information received from a plurality of image display apparatuses. The real-time viewer rating information may include information about a channel share, the number of channel viewers, a program share of a specific channel, the number of viewers for the specific channel, etc. The real-time

viewer rating information may further include real-time channel search information or real-time program search information.

The processor **720** may determine whether images including broadcasting information received from a plurality of image display apparatuses are real-time broadcast images by comparing the received images with real-time broadcast images received through the network.

In the case of a real-time broadcast image, the processor **720** may extract broadcasting information such as channel information, program information, etc. from the broadcast image and generate real-time viewer rating information based on the extracted broadcasting information in the afore-described manner.

The network interface **730** may transmit the real-time viewer rating information to at least one of the image display apparatuses. Preferably, the real-time viewer rating information is transmitted to all image display apparatuses that have transmitted broadcasting information or images including the broadcasting information.

Subsequently, the image display apparatus **100** displays an object representing the received real-time viewer rating information (S**1850**). Step S**1850** corresponds to step S**2150** of FIG. **21**.

The real-time viewer rating object may include a plurality of broadcast program items. Especially, the real-time broadcast program items may be arranged in the order of their viewer ratings. The real-time viewer rating object may further include broadcast program type items, a real-time ranking item, a daily ranking item, a weekly ranking item, and a monthly ranking item. The broadcast program items may be arranged by type, real-time ranking, daily ranking, weekly ranking, and monthly ranking. Accordingly, since a plurality of broadcast programs are arranged according to various criteria, user convenience can be increased.

The real-time viewer rating object may not include channel number information. That is, the real-time viewer rating object may be configured to include a plurality of program-based program items.

Upon receipt of an input requesting selection of a specific program (S**1865**), the image display apparatus **100** transmits channel information about the program to the set-top box **250** or the remote controller **200** (S**1870**). Then the image display apparatus **100** receives a broadcast signal of the selected program from the set-top box **250** (S**1880**) and displays the selected broadcast program (S**1890**). Step S**1865** corresponds to step S**1965** of FIG. **19** and step S**2165** of FIG. **21**. Step S**1870** corresponds to step S**1970** of FIG. **19** and step S**2170** of FIG. **21**. Steps S**1880** and S**1890** correspond to steps S**2180** and S**2190** of FIG. **21**.

With the object including the plurality of broadcast program items displayed on the display **180** of the image display apparatus **100**, the user may select one of the broadcast program items using the remote controller (S**1965**).

The user input interface **150** of the image display apparatus **100** may receive a remote control signal from the remote controller **200** and select a broadcast program according to the remote control signal.

Especially when the remote controller **200** outputs a pointing signal corresponding to its movement as described before with reference to FIG. **5**, the controller **170** of the image display apparatus **170** may control reception of the pointing signal and display of a pointer image on the display **180** based on the pointing signal. The controller **170** may select one of the plurality of broadcast program items based on the pointing signal.

Meanwhile, the image display apparatus **100** may transmit channel information about the selected program to the remote controller **200**. Upon selection of one of the plurality of broadcast programs included in the object, the controller **170** may extract channel number information or channel name information about the selected program from a channel map stored in the memory **140**.

The controller **170** may transmit the channel number information or channel name information about the selected program to the remote controller **200**. Or the controller **170** may transmit the channel number information or channel name information about the selected program directly to the set-top box **250**.

The remote controller **200** may receive the channel number information or channel name information about the selected program from the user input interface **150** of the image display apparatus **100**.

Then the remote controller **200** may transmit information about the channel number of the program based on the received channel number or channel name information to the set-top box **250**.

The remote controller **200** may communicate with the set-top box **250** by IR communication and with the image display apparatus **100** by RF communication. Since the remote controller **200** exchanges data with the image display apparatus **100** in an RF-based manner but with an external device such as the set-top box **250** in an IR-based manner, the remote controller **200** may be referred to as an IR blaster.

To conduct the IR communication, the remote controller **200** may receive key values for remotely controlling the set-top box **250**, from the set-top box **250**, the image display apparatus **100**, or the server **500**. When the set-top box **250** is powered on, the key values may be received from the set-top box **250**, the image display apparatus **100**, or the server **500**.

The set-top box **250** receives a broadcast signal of a channel corresponding to the received channel number information. For this purpose, the set-top box **250** may receive the selected channel through the tuner **270** or a stream of the channel through the network interface **255**.

The set-top box **250** transmits the received broadcast signal of the channel to the image display apparatus **100**. The external device interface **130** of the image display apparatus **100** receives the broadcast signal of the selected program from the set-top box **250**. The controller **170** of the image display apparatus **100** processes the received broadcast signal by demultiplexing, decoding, etc. and controls display of the selected program on the display **180**.

FIG. **22** and FIGS. **16**A to **16**E are views referred to for describing steps S**1805** through S**1850** of FIG. **18**. For FIGS. **16**A to **16**E, their already given description will be referred to.

FIG. **22** is an exemplary view illustrating transmission of a broadcast signal **2210** from the set-top box **250** to the image display apparatus **100**.

The image display apparatus **100** may display a broadcast image **2215** corresponding to the received broadcast signal **2210** on the display **180**.

Particularly, the broadcast image **2215** may include broadcasting information **2220** representing a channel name 'MBS HD' and a program name 'Infinite Challenge'.

Meanwhile, the image display apparatus **100** transmits the image **1630** including the channel name and the program name or the broadcast image **1625** including the channel name and the program name to the server **500** in FIG. **16**A.

In FIG. **16**B, the server **500** determines whether the received image **1625** is a real-time broadcast image by comparing the image **1625** with the real-time broadcast images **1640** received through the network.

In FIG. **16**C, the server **500** generates the real-time viewer rating information **1650**.

In FIG. **16**D, the server **500** transmits the real-time viewer rating information **1655** to the image display apparatus **100**.

In FIG. **16**E, the image display apparatus **100** displays the real-time viewer rating object **1665** along with the broadcast image **1660**.

The controller **170** of the image display apparatus **100** may control generation of the real-time viewer rating object **1665** using the real-time viewer rating information **1655** received from the server **500** and thus may control display of the object **1665** on the display **180**.

The broadcasting information **1620** indicating the channel name 'MBS HD' and the program name 'Infinite Challenge' is also displayed, by way of example.

Therefore, the user can readily view real-time viewer rating information. In addition, as the user can switch to another broadcast channel or broadcast program according to the viewer ratings, user convenience can be increased.

Meanwhile, the image display apparatus **100** may generate a channel map in the channel scan mode. Channel information may be extracted from the channel map in step S**1870**.

The channel map generation of the image display apparatus **100** has been described with reference to FIGS. **11**A to **12**D and thus its description is not provided herein.

FIGS. **23**A to **23**E are views referred to for describing steps S**1865** to S**1890** of FIG. **18**.

FIG. **23**A is an exemplary view illustrating display of a broadcast image **2360** corresponding to a broadcast signal received from the set-top box **250** on the display **180** of the image display apparatus **100**. A viewer rating object **2365** may further be displayed together with the broadcast image **2360** on the display **180**.

Particularly, the broadcast image **2360** may include broadcasting information **2320** representing a channel name 'MBS HD' and a program name 'Infinite Challenge'.

In FIG. **23**A, for IR communication between the remote controller **200** and the set-top box **250**, the image display apparatus **100** transmits key values RF**1** for remotely controlling the set-top box **250** to the remote controller **200**. The image display apparatus **100** may transmit the key values RF**1** for remotely controlling the set-top box **250** to the remote controller **200** by RF communication.

FIG. **23**B is an exemplary view illustrating selection of a specific program item **2310** from among a plurality of program items listed in the viewer rating object **2365** using a pointing signal RF**2** from the remote controller **200**. A pointer image **205** corresponding to the pointing signal RF**2** of the remote controller **200** points at the program item **2310**, thus selecting the program item **2310** in FIG. **23**B. The remote controller **200** may transmit the pointing signal RF**2** for selecting the program item **2310** to the image display apparatus **100** by RF communication.

FIG. **23**C is an exemplary view illustrating transmission of channel information RF**3** about the selected program item **2310** from the image display apparatus **100** to the remote controller **200**.

For example, if the channel number and channel name of the selected program item 'KBC News' are CH **20** and KBC, respectively, the image display apparatus **100** may transmit channel information RF**3** including at least one of the channel number and the channel name to the remote controller **200** by RF communication.

Meanwhile, upon selection of a program item, the image display apparatus **100** may detect a channel number matching to the program item in a pre-stored channel map. The channel map may be generated in the method described before with reference to FIGS. **11**A to **14**C. For an example of the channel map, FIG. **15** is referred to.

Specifically, the controller **170** of the image display apparatus **100** may extract the channel number of the selected program item by comparing the selected program item with the channel map stored in the memory **140**.

FIG. **23**D is an exemplary view illustrating transmission of channel number information IR**1** about the selected program item **2310** from the remote controller **200** to the set-top box **250**.

For example, the remote controller **200** may transmit a key value IR**1** of the channel number information CH **20** about 'KBC News' to the set-top box **250**.

Therefore, the set-top box **250** receives a broadcast signal of the selected channel CH **20** by channel switching and transmits the received broadcast signal to the image display apparatus **100**, as illustrated in FIG. **23**E. Eventually, the image display apparatus **100** may display a broadcast image **1420** of CH **20** on the display **180**. Due to the channel switching, an object **1425** indicating the channel number CH **20** and the channel name KBC may be displayed.

In the case of broadcast signals provided by cable system operators, different cable system operators may assign different channel names to the same channel number or the same cable system operator may assign different channel names to the same channel number according to subscribed broadcasting service types. As more and more channel numbers are created, channel numbers do not accurately match to channel names, inconveniently.

As described before, it is preferred to display an object listing a plurality of program items such as a viewer rating object and select a program from the object, rather than a program is viewed by selecting a channel number.

In accordance with an embodiment of the present invention, one of a plurality of broadcast program items is selected in a program-based fashion without channel number information. Therefore, the image display apparatus can display a user-intended broadcast program reliably.

FIG. **24** illustrates an exemplary object listing a plurality of program items.

Referring to FIG. **24**, upon receipt of viewer rating information from the server **500**, the image display apparatus **100** may display a broadcast program list **2400** that lists a plurality of broadcast program items according to their viewer ratings.

The broadcast program list **2400** may include a viewer rating object that provides viewer rating information. For instance, the viewer rating object may provide real-time viewer rating information.

The real-time viewer rating object may include a plurality of broadcast program items. Particularly, the real-time broadcast program items may be arranged in the order of their viewer ratings. Thus, the real-time viewer rating object may further include broadcast program type items **2405** and a real-time/daily/weekly/monthly ranking item **2415** so that broadcast program items **2410** may be arranged by type, real-time ranking, daily ranking, weekly ranking, and monthly ranking.

Each broadcast program item may include a program name and a thumbnail image of the program. Therefore, the user can readily identify the program.

That is, the broadcast program list lists broadcast program items by viewer rating and each broadcast program item includes its thumbnail image.

Upon selection of a program item **2412** from among the program items **2410**, a detailed information item **2425**, a view item **2443**, a thumbnail image item **2446**, and detailed infor-

mation **2449** may further be displayed in regard to the selected program **2412**. Therefore, user convenience can be increased.

As illustrated in FIG. **24**, the real-time viewer rating object may not include channel number information. This means that the real-time viewer rating object may list a plurality of program items in a program-based manner.

In general, a cable system operator assigns different channel numbers to the same channel in different regions. Therefore, it may be difficult to match channel numbers in a broadcast program list including real-time viewer rating information, as illustrated in FIG. **24**. Although channel numbers can be set with respect to the image display apparatus **100**, the embodiment of the present invention is characterized in that a broadcast program list is made based on broadcast program names without channel numbers.

That is, each broadcast program item may include a program name, a playing time, and a thumbnail image of the broadcast program, without the channel number of the broadcast program, as illustrated in FIG. **24**.

In this manner, one of a plurality of broadcast program items can be selected in a program-based fashion without channel number information. Accordingly, the user can view an intended broadcast program easily.

Especially when the user selects an intended broadcast program item by voice, the image display apparatus **100** can readily select the broadcast program item in the broadcast program list **2400** by voice recognition.

Since the program list **2400** is created based on program items, not based on channel numbers, a user-intended program can be selected simply and accurately by voice recognition.

It is also possible to select a broadcast program in the broadcast program list **2400** using the pointer **205** representing movement of the remote controller **200**.

FIG. **25** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention, FIG. **26** is a flowchart illustrating a method for operating the server according to another embodiment of the present invention, FIG. **27** is a diagram illustrating a signal flow for performing an operation between the image display apparatus and the server according to another embodiment of the present invention, and FIGS. **28**A to **28**G are views referred to for describing the operation method illustrated in FIG. **25** or **26**.

Steps S**2505** to S**2530** correspond to steps S**1805** to S**1830** of FIG. **18** and thus their description is not provided herein. Steps S**2505** to S**2530** also correspond to steps S**2705** to S**2730** of FIG. **27**.

The server **500** extracts real-time broadcasting information based on a received image (S**2635**). Step S**2635** may correspond to step S**2735** of FIG. **27**.

Specifically, the processor **720** of the server **500** may generate real-time viewer rating information using real-time broadcasting information received from each of a plurality of image display apparatuses. The real-time viewer rating information may include information about a channel share, the number of channel viewers, a program share of a specific channel, the number of viewers for the specific channel, etc. The real-time viewer rating information may further include real-time channel search information or real-time program search information.

The image display apparatus **100** receives a command requesting detailed information (S**2540**) and transmits the detailed information request command to the server **500** (S**2550**). Steps S**2540** and S**2550** correspond to steps S**2740** and S**2750** of FIG. **27**.

The image display apparatus **100** may receive a user input being the detailed information request command, while it is displaying a broadcast program. For example, the detailed information request command may be received by input of a specific key of the remote controller **200**. Detailed information may be about a background, persons, products, etc. appearing in a broadcast image.

In another example, the detailed information request command may be received by a user input, while an advertisement is being displayed after a broadcast program ends. For instance, the detailed information request command may be received by input of a specific key of the remote controller **200**. Detailed information may refer to details of a product appearing in the advertisement.

Upon receipt of the detailed information request command, the controller **170** of the image display apparatus **100** may transmit the detailed information request command to the server **500** in order to display detailed information.

Then the server **500** receives the detailed information externally (S**2655**) and transmits the detailed information to the image display apparatus **100** (S**2660**). Steps S**2655** corresponds to step S**2755** of FIG. **27** and steps S**2660** corresponds to step S**2560** of FIG. **25** and step S**2760** of FIG. **27**.

Specifically, the processor **720** of the server **500** collects detailed information in response to the detailed information request command. Especially in the case of a real-time broadcast image, the server **500** may receive metadata regarding the detailed information from a broadcasting station server.

The processor **720** of the server **500** may control transmission of the received metadata to the image display apparatus **100**.

The image display apparatus **100** displays the received detailed information (S**2570**). Step S**2570** corresponds to step S**2770** of FIG. **27**.

The controller **170** of the image display apparatus **100** controls display of the received detailed information along with a broadcast image.

FIGS. **28**A to **28**G are views referred to for describing the method for operating the image display apparatus illustrated in FIG. **25**.

FIG. **28**A is an exemplary view illustrating transmission of a broadcast signal **2810** from the set-top box **250** to the image display apparatus **100**.

The image display apparatus **100** may display a broadcast image **2825** corresponding to the received broadcast signal **2810** on the display **180**.

Especially, the broadcast image **2825** may include broadcasting information **2820** such as channel name information 'MBS HD' at its corner.

As a broadcast program ends, only the channel name information is shown in the broadcast image in the illustrated case of FIG. **28**A. That is, the broadcast image **2825** may be an advertisement image.

FIG. **28**B is an exemplary view illustrating transmission of a channel name image **2030** or the broadcast image **2825** including the channel name from the image display apparatus **100** to the server **500**.

While the broadcast image **2825** is a full broadcast image in FIG. **28**B, the broadcast image **2825** may include only a broadcasting information part. That is, reference numeral **2030** denotes the image including broadcasting information.

FIG. **28**C is an exemplary view illustrating input of a detailed information request command Smo to the image display apparatus **100** by manipulation of a specific key in the remote controller **200**. The image display apparatus **100** may display an object **2835** representing a detailed information request on the display **180**.

In FIG. **28**C, the image display apparatus **100** also transmits a detailed information request command Sde to the server **500**, by way of example.

FIG. **28**D is an exemplary view illustrating determining matching detailed information by comparing detailed information **2840** received through the network with the image **2825** received from the image display apparatus **100** at the server **500**.

Because the server **500** determines a channel number for the image display apparatus **100** from the channel name image **2030** or the broadcast image **2825** including the channel name received from the image display apparatus **100**, the server **500** may access a broadcasting station server related to the channel number, receive detailed information items **2840***a*, **2840***b* and **2840***c* from the broadcasting station server through the network, and store the detailed information items **2840***a*, **2840***b* and **2840***c* in the memory **740**.

To be more specific, the server **500** may receive detailed information items about time-scheduled advertisements from the broadcasting station server and store the detailed information items in the memory **740**.

The processor **720** of the server **500** compares the received image **2825** with the detailed information items **2840***a*, **2840***b*, and **2840***c*. If any of the detailed information items **2840***a*, **2840***b*, and **2840***c* matches to the image **2825**, the processor **720** determines that the matching information item is detailed information about the image **2825**.

In the illustrated case of FIG. **28**D, the second detailed information item **2840***b* corresponds to the image **2825**, by way of example.

FIG. **28**E is an exemplary view illustrating transmission of detailed information **2850** related to the second detailed information item from the server **500** to the image display apparatus **100**.

The image display apparatus **100** may receive the detailed information **2850** from the server **500** through the network interface **135**.

FIG. **28**F is an exemplary view illustrating display of an object **2865** representing the detailed information along with a broadcast image **2060** in the image display apparatus **100**.

The controller **170** of the image display apparatus **100** may generate the detailed information object **2865** using the detailed information **2850** received from the server **500** and may control display of the detailed information object **2865** on the display **180**. Therefore, the user can readily view details of a broadcast image, while viewing the broadcast image.

FIG. **28**G is an exemplary view illustrating transmission of the detailed information received from the server to a nearby portable terminal **2800** by the image display apparatus **100** and display of the detailed information object **2865** on the display of the portable terminal **2800**.

Since the broadcast image **2825** is displayed on the display **180** of the image display apparatus **100** and the detailed information object **2865** is displayed on the display of the portable terminal **2800**, the user can obtain the details of the on-going broadcast image, while viewing the broadcast image without interruptions.

FIG. **29** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention, FIG. **30** is a flowchart illustrating a method for detecting an image including broadcasting information in the image display apparatus according to another embodiment of the present invention, and FIGS. **31**A to **33**B are views referred to for describing various examples of the operation method illustrated in FIG. **29**.

The image display apparatus **100**, particularly the controller **170** determines whether a recording mode has been set (S**2910**). The recording mode may be set in response to reception of a user input.

For example, when the user enters an input requesting display of a scheduled recording menu to schedule recording of a program, the controller **170** may control display of the scheduled recording menu on the display **180**.

FIG. **31**A is an exemplary view illustrating a user's selection of an intended program item **3110** on an EPG screen **3100** displayed on the display **180**. As the user selects the program item **3110** on the EPG screen **3100**, he or she can set the recording mode for the broadcast program.

While the remote controller **200** capable of displaying a pointer is shown in FIG. **31**A, this is purely exemplary. Thus, the program item **3110** may be selected by manipulating a directional key of a general remote controller or a directional key given as a local key.

When the recording mode has been set in this manner, the image display apparatus **100**, particularly the controller **170** determines whether it is time to record the program (S**2915**). If it is time to record the program, the controller **170** controls reception of a broadcast signal of the program according to the recording mode (S**2920**).

In FIG. **31**A, in the case where the recording-scheduled program **3110** starts at 8:00 PM, the controller **170** determines whether it is time to record the program **3110**. If it is time to record the program **3110**, the controller **170** controls reception of a broadcast signal of the program **3110** in the recording mode.

For instance, if it is time to record the program **3110** while the user is viewing CH **6-1** through the image display apparatus **100**, the controller **170** may control the broadcasting receiver **105** to receive a broadcast signal on CH **7-1** for which the recording mode has been set.

If the image display apparatus **100** is provided with a plurality of tuners, while a broadcast signal is being received on the current channel CH **6.1** through the first tuner, a broadcast signal is also received on CH **7-1** through the second tuner, starting from the recording time. Therefore, the image display apparatus **100** can continue displaying a broadcast image corresponding to the broadcast signal of CH **6-1** irrespective of the recording mode.

On the contrary, if the image display apparatus **100** has a single tuner, the tuner may switch from CH **6-1** to CH **7-1** to thereby receive a broadcast signal on CH **7-1**. Therefore, when the recording time comes during displaying a broadcast image of CH **6-1**, the image display apparatus **100** may start to display a broadcast image of CH **7-1**.

When the image display apparatus **100** is powered off before the recording starts, the image display apparatus **100** may be powered on again and receive a broadcast signal of the recording-scheduled channel at the scheduled recording time.

Then the image display apparatus **100**, particularly the controller **170** determines whether an image including broadcasting information is included in the broadcast signal (S**2925**). In the presence of a broadcasting information image (S**2930**), the image display apparatus **100** stores broadcast content corresponding to the broadcast signal in the recording mode (S**2935**). In the absence of a broadcasting information image (S**2930**), the image display apparatus **100** does not store the broadcast content corresponding to the broadcast signal in the recording mode (S**2940**).

In the case where the recording mode is set using the EPG information received in a broadcast signal as illustrated in FIG. **31**A, an advertisement interposed between programs may also be recorded.

In FIG. **31**A, while the EPG reveals that the program item **3110** 'Oh! Lady' scheduled to be recorded starts on 8:00 PM and the previous program 'Bring It On' also ends on 8:00 PM, the recording-scheduled program 'Oh! Lady' may actually start at a different time, for example, at 8:05 or 8:10 PM. The starting time of a broadcast program may be changed under the circumstances of a broadcasting station.

In this context, an embodiment of the present invention provides a method for recording only an intended broadcast program without any advertisement.

For this purpose, the controller **170** determines whether a broadcasting information image exists in a received broadcast signal.

With reference to FIG. **30**, a method for determining whether an image including broadcasting information exists in a broadcast signal will be described below.

Referring to FIG. **30**, the controller **170** extracts a broadcast image of a channel for which the recording mode has been set in order to determine whether a broadcasting information image exists in the broadcast signal (S**3010**).

The controller **170** extracts a broadcast image of a recording-scheduled broadcast program. For example, the video processor **320** of FIG. **3** may extract an image on a frame basis from a decoded broadcast video.

Then the controller **170** compares the extracted broadcast image with a pre-stored broadcasting information image or a broadcasting information image received through the network (S**3020**) and determines whether an area corresponding to the broadcasting information image exists in the extracted broadcast image (S**3030**).

In the embodiment of the present invention, an image is classified as a program image or an advertisement image depending on whether the image includes a channel name (e.g. MBS, CBB, KBB, NCC, etc.) or a logo indicating the channel name.

To distinguish a program image from an advertisement image, the controller **170** compares the extracted broadcast image with broadcast information images stored in the memory **140** or broadcasting information images received through the network interface **135**.

Broadcasting information images may be classified by broadcast channel in the memory **140**. The broadcasting information images may be received from a specific server through the network interface **135** and then stored.

Meanwhile, to receive a broadcasting information image in real time from the server **500** through a network, the image display apparatus **100** may transmit recording-scheduled channel information and recording time information to the server **500**.

The controller **170** determines whether an area corresponding to a broadcasting information image is present in the extracted broadcast image by checking whether there is an identical area between the extracted broadcast image and the pre-stored broadcasting information images or the broadcasting information images received through the network interface **135**.

Subsequently, the controller **170** may extract a broadcast image of a channel received for scheduled recording in order to determine the absence or presence of a broadcasting information image in the broadcast signal. This operation corresponds to step S**3010** of FIG. **30**.

The controller **170** transmits the extracted broadcast image and receives information indicating whether the extracted broadcast image includes an area with a broadcasting information image from the server **500**.

That is, unlike the operation illustrated in FIG. **30**, the server **500** may determine whether the extracted broadcast image includes an image with a channel name (e.g. MBS, CBB, NCC, etc.) or a logo indicating the channel name. Thus, the server **500** transmits the information indicating whether the extracted broadcast image includes a broadcasting information image to the image display apparatus **100**. The image display apparatus **100**, particularly the controller **170** determines from the received information whether the broadcast signal includes a broadcasting information image.

The image display apparatus **100**, particularly the controller **170** determines whether it is time to end the recording (S**2945**). If it is time to end the recording, the controller **170** discontinues storing the broadcast content. If the recoding still runs, the controller **170** repeats step S**2925** to S**2940** to continue the recording.

Referring to FIG. **31**B, the image display apparatus **100** may receive a broadcast signal on CH **7-1** set to the recording mode through the set-top box **250** at a first time (T=t**1**), for example, at 8:00 PM after the recording time. An advertisement image **3120**, not the broadcast program 'Oh! Lady' to be recorded, is displayed on the display **180**, by way of example.

The controller **170** extracts an image from the advertisement image **3120** and determines whether the image is an image of the broadcast program or an advertisement image by comparing the extracted image with a pre-stored broadcasting information image or a broadcasting information image received through the network.

In FIG. **31**B, while a channel number is shown, neither a channel name (e.g. MBS, CBB, KBB, NCC, etc.) nor a program name (e.g. Oh! Lady, ABC News, DR. OZ, etc.) is shown. Accordingly, the controller **170** does not store the image **3120** despite the recording time, determining that the image **3120** is an advertisement image through detection of such a logo as including a channel name.

Referring to FIG. **31**C, the image display apparatus **100** continues to receive a broadcast signal **3105** on CH **7-1** set to the recording mode through the set-top box **250** at a second time (T=t**2**), for example, at 8:05 PM. Not an advertisement image but a broadcast image **3130** of the broadcast program 'Oh! Lady' is displayed on the display **180**, by way of example.

The controller **170** extracts an image from the broadcast program image **3130** and determines whether the image is a broadcast program image or an advertisement image by comparing the extracted image with a pre-stored broadcasting information image or a broadcasting information image received through the network.

In FIG. **31**C, a channel number, a channel name **3145**, MBS HD identifying a broadcast channel, and a broadcast program name 'Oh! Lady' are illustrated. Accordingly, the controller **170** stores the image **3130** in the memory **140**, determining that the image **3130** is an image of the recording-scheduled broadcast program through detection of an image area **3140** including the channel name **3145**.

Referring to FIG. **31**D, the image area **3140** including the channel name **3145** exists in a received broadcast image **3150** at a third time (T=t**3**), for example, at 8:10 PM. Therefore, the image display apparatus **100** continues to store the image **3150**. For user convenience, an object **3155** indicating recording in progress may be displayed.

Referring to FIG. **31**E, the channel name **3145** does not appear in a received broadcast image **3160** at a fourth time (T=t**4**), for example, at 8:30 PM. For example, if an advertisement is scheduled in the middle of the broadcast program, an intermediate advertisement image **3160** may be displayed as illustrated in FIG. **31**E.

Because the channel name, MBS HD and the broadcast program name, Oh! Lady are not displayed, the controller **170**

does not store the image **3160** in the memory **140** despite the recording time, determining that the image **3160** is an advertisement image.

Referring to FIG. **31**F, the image area **3140** including the channel name **3145** appears in a received broadcast image **3170** at a fifth time (T=t**5**), for example, at 8:35 PM. Thus the image display apparatus **100** resumes storing the image **3170** in the memory **140**. For user convenience, the object **3155** indicating recording in progress may be displayed.

Referring to FIG. **31**G, the channel name **3145** does not exist in a received broadcast image **3180** at a sixth time (T=t**6**) corresponding to the ending time of recording, for example, at 9:00 PM.

Because the channel name, MBS HD and the broadcast program name, Oh! Lady are not displayed, the controller **170** does not store the image **3180** in the memory **140** despite the recording time, determining that the image **3180** is an advertisement image.

As described above, when the recording mode is set, the image display apparatus determines whether a broadcasting information image exists in a broadcast signal. In the presence of the broadcasting information image, the image display apparatus stores broadcast content corresponding to the broadcast signal. As a result, user-intended broadcast content can be accurately recorded and thus user convenience can be increased.

If the step of determining the presence or absence of a broadcasting information image (S**2925**) is repeated, the controller **170** may monitor the existence of a broadcasting information image more frequently at a recording starting time or a recording ending time than at any other time point in the recording mode.

Since an advertisement image is usually received at the recording starting time, reception of a broadcasting information image is monitored around the recording starting time more frequently. Consequently, only images of a desired program can be recorded reliably.

An advertisement image is also received generally at the recording ending time and thus reception of a broadcasting information image is monitored around the recording ending time more frequently. Consequently, only images of a desired program can be recorded reliably.

While a broadcast image is received through the set-top box **250** in FIGS. **31**A to **31**G, this is purely exemplary. Thus, the image display apparatus **100** may receive a broadcast image through the broadcasting receiver **105**, particularly the tuner unit **110**.

FIG. **32** is an exemplary view illustrating comparison between an extracted broadcast image with a pre-stored broadcasting information image or a broadcasting information image received through the network.

The controller **170** extracts an image from the broadcast image **3130** of the recording-scheduled channel, CH **7-1** in the recording mode. The extracted image may be a full video frame but it is the partial area **3140** of the video frame in FIG. **32**, by way of example.

The partial area **3140** resides at the same position across a plurality of frames and thus the controller **170** may extract this area **3140**. Then the controller **170** compares an image **3210** in the extracted area with a broadcasting information image **3220** received from the server **500** through the network. If the image **3210** in the extracted area is identical to the broadcasting information image **3220**, the image display apparatus **100**, particularly the controller **170** controls storage of broadcast content of the broadcast program. The memory **140** stores both the video and audio of the broadcast program.

FIG. **33**A is an exemplary view illustrating transmission of the real-time viewer rating information **3255** from the server **500** to the image display apparatus **100**.

The image display apparatus **100** may receive the real-time viewer rating information **3255** from the server **500** through the network interface **135**. As illustrated in FIG. **32**, the network interface **135** may receive the broadcasting information image **3220** and the real-time viewer rating information **3255** together.

Meanwhile, the broadcasting program image **3130** is shown as including the image area **3140** with the channel name **3145** on the display **180**, by way of example. Therefore, the memory **140** may store broadcast content of the broadcast program.

FIG. **33**B is an exemplary view illustrating display of a real-time viewer rating information object **3255** along with a broadcast image **3150**.

The controller **170** may control generation of the real-time viewer rating information object **3255** using real-time viewer rating information received from the server **500** and control display of the real-time viewer rating information object **3255** on the display **180**.

Because the broadcast program image **3150** includes the image area **3140** with the channel name **3145**, the memory **140** continues to store the broadcast content of the broadcast program. For user convenience, the object **3155** indicating recording in progress may be displayed.

FIG. **34** is a flowchart illustrating a method for operating the image display apparatus according to another embodiment of the present invention, FIG. **35** is a diagram illustrating a signal flow for performing an operation between the image display apparatus and the server according to another embodiment of the present invention, and FIGS. **36**A to **37**E are views referred to for describing the method for operating the image display apparatus illustrated in FIG. **34**.

The image display apparatus **100** displays a broadcast program (S**3410**). Step S**3410** corresponds to step S**3510** of FIG. **35**.

The image display apparatus **100** may receive a broadcast signal through the tuner unit **110**, the network interface **135**, or the external device interface **130** illustrated in FIG. **2**.

A broadcast signal from the tuner unit **110**, which is received through the antenna, may be a terrestrial broadcast signal. Especially in the case of terrestrial digital broadcasting, the broadcast signal may include EPG information. The received broadcast signal is processed in the controller **170** and the processed video of a broadcast program corresponding to the broadcast signal may be displayed on the display **180**.

FIG. **36**A is an exemplary view illustrating display of a specific broadcast program image **3610**, specifically an image of a baseball program on the display **180**.

A broadcast signal from the network interface **135** or the external device interface **130** may be received through the set-top box **250**, as illustrated in FIG. **1**. The received broadcast signal is processed in the controller **170** and the processed video of a broadcast program corresponding to the broadcast signal may be displayed on the display **180**.

The controller **170** of the image display apparatus **100** determines whether an application execution input has been received (S**3145**). Upon receipt of the application execution input, the controller **170** acquires broadcast program information (S**3420**). Steps S**3415** and S**3420** correspond to steps S**3515** and S**3520**.

The controller **170** may determine whether the application execution input has been received by an input of a local key or an input from the remote controller **200**.

FIG. **36**B is an exemplary view illustrating manipulation of a specific key **203** in the remote controller **200**. The controller **170** may determine that the application execution input has been received for the on-going broadcast program **3610** in response to the input of the specific key **203** of the remote controller **200**.

The controller **170** may control display of an object indicating the application execution input. For example, an object **3615** "More Info" is displayed in FIG. **36**B.

The controller **170** acquires information about the on-going broadcast program before executing an application corresponding to the broadcast program in response to the application execution input. Specifically, the controller **170** may acquire information about the channel name, program name, etc. of the on-going broadcast program.

If the received broadcast signal is a terrestrial digital broadcast signal received through the antenna, the broadcast signal includes EPG information and thus the controller **170** may acquire channel name information and program name information from the EPG information.

FIG. **36**C is an exemplary view illustrating EPG information **3630** about an on-going channel CH**6**. The EPG information **3630** provides program information **1035** that specifies the genre, program name, and playing time of the on-going broadcast program.

If the received broadcast signal does not include EPG information, for example, the received broadcast signal is an analog signal received through the antenna or a broadcast signal received through the set-top box **250**, the controller **170** may detect a logo image from a received broadcast image and acquire program information from the detected logo image. Especially, the controller **170** may transmit the detected logo image to the server **500** and then receive program information such as the name of the broadcast program from the server **500**. Subsequently, the controller **170** determines whether the application related to the broadcast program has been installed (S**3425**). If the application has not been installed, steps S**3430**, S**3435** and S**3440** are performed. On the other hand, if the application has been installed, steps S**3450** and S**3455** are performed immediately.

Steps S**3425**, S**3450**, and S**3455** correspond to steps S**3525**, S**3550**, and S**3555** of FIG. **35**.

The controller **170** of the image display apparatus **100** determines whether the application related to the broadcast program has been installed. For example, the controller **170** determines whether the application related to the broadcast program has been installed by searching a list of installed applications.

If the application related to the broadcast program has been installed, the controller **170** controls immediate execution of the application and display of the executed application on the display **180**.

FIG. **36**D is an exemplary view illustrating execution and display of an application **3640** regarding the baseball program image **3610** that the user is viewing. Especially, the baseball program image **3610** and the application **3640** are displayed together.

As illustrated in FIG. **36**D, the application **3640** may provide the rankings of teams, hitters, and pitchers, etc. The application **3640** may also include a schedule/result item, a bulletin board item, etc. Therefore, the user can readily view intended additional information.

Meanwhile, applications may be installed and executed on a broadcast program basis. In addition, each application may include different contents according to program characteristics.

If the application has not been installed, steps S**3430**, S**3435**, and S**3440** are performed.

That is, the image display apparatus **100** accesses the server **500** and receives an application list from the server **500** (S**3430**). Upon selection of a specific application item from the list (S**3435**), the image display apparatus **100** downloads and installs the selected application (S**3440**).

Steps S**3430**, S**3435** and S**3440** will be described in greater detail with reference to FIG. **35**. The image display apparatus **100** accesses the server **500** through the network interface **135** and transmits information about the name of the program that the user is viewing to the server **500** (S**3530**). Then the image display apparatus **100** receives an application list related to the broadcast program from the server **500** (S**3532**).

FIGS. **37**A, **37**B and **37**C correspond to FIGS. **36**A, **36**B and **36**C. That is, FIG. **37**A illustrates display of a specific broadcast program image **3710**, FIG. **37**B illustrates receipt of an application execution input by input of the specific key **203** in the remote controller **200**, and FIG. **37**C illustrates program information **3735** included in an EPG **3730**.

FIG. **37**D is an exemplary view illustrating display of an application list **3740** related to the broadcast program, received from the server **500** on the display **180**.

The application list **3740** related to the broadcast program may include a plurality of application items. In FIG. **37**D, four applications are shown. The application list **3740** may be displayed along with a representative image **3750** of the on-going broadcast program. Obviously, the representative image **3750** may also be received from the server **500**.

The controller **170** of the image display apparatus **100** may receive an input that selects one of the plurality of application items in the list from a local key or the remote controller **200** (S**3535**). The controller **170** of the image display apparatus **100** accesses the server **500** and requests download of the selected application to the server **500** (S**3540**). The image display apparatus **100** downloads the selected application from the server **500** (S**3542**) and installs the downloaded application (S**3544**). Then the afore-described steps S**3450** and S**3455** are performed.

Upon selection of an application item **3745** from the list **3140** illustrated in FIG. **37**D, an application **3760** corresponding to the selected application item **3745** may be installed and displayed as illustrated in FIG. **37**E. Therefore, the user can view additional information about the broadcast program easily.

FIG. **38** is a flowchart illustrating a method for operating the image display apparatus according to a further embodiment of the present invention, and FIGS. **39**A to **40**C are views referred to for describing various examples of the method for operating the image display apparatus illustrated in FIG. **38**.

The image display apparatus **100** enters the automatic channel scan mode (S**3810**). While a menu screen is being displayed, the automatic channel scan mode may be selected by input of a local key of the image display apparatus **100** or input of a specific key of the remote controller **200**. When the automatic channel scan mode is selected, the controller **170** may enter the automatic channel scan mode.

In accordance with an embodiment of the present invention, the automatic channel scan mode may be classified into fast mode and normal mode. In the fast mode, a channel search is fast completed by scanning only some channels, whereas in the normal mode, total channels are scanned.

FIG. **40**A is an exemplary view illustrating display of an automatic channel scan mode screen **4010** on the display **180**. In FIG. **40**A, a fast mode object **4013** and a normal mode object **4016** are displayed together on the automatic channel

scan mode screen **4010** so that one of the fast mode and the normal mode may be selected according to user selection.

The image display apparatus **100** determines whether a first scan mode has been selected from among a plurality of scan modes (S**3815**). If the first scan mode has been selected, step S**3820** is performed and otherwise, step S**3860** is performed. The controller **170** determines whether the fast mode has been selected by a local key input or an input from the remote controller **200** and, if the fast mode has been selected, controls execution of the fast mode.

Referring to FIG. **40**A, upon selection of the fast mode object **4013** on the automatic channel scan mode screen **4010**, the image display apparatus **100** may scan channels in the fast mode.

FIG. **40**B is an exemplary view illustrating display of a screen **4020** indicating an antenna connection or a cable connection, when the fast mode is selected. A 'Start' object **4023** and a 'Set later' object **4026** are also displayed.

FIG. **40**C is an exemplary view illustrating display of a fast mode start screen **4030** on the display **180**. In FIG. **40**C, the fast mode start screen **4030** may be displayed shortly after selection of the fast mode object **4013** illustrated in FIG. **40**A or shortly after selection of the 'Start' object **4023** illustrated in FIG. **40**B.

Referring to FIG. **4**C, upon selection of a 'Yes' object **4033** in the fast mode start screen **4030**, the fast mode may be set immediately. On the other hand, upon selection of a 'No' object **4036** in the fast mode start screen **4030**, the normal mode may be set immediately.

The image display apparatus **100** scans broadcast signals of some channels among broadcast signals of a plurality of available channels (S**3820**). In the fast automatic channel scan mode, only a part of total channels available to the image display apparatus **100** are scanned and channel number information about the total channels are acquired using channel number information and channel name information about the scanned channels.

For this purpose, the image display apparatus **100** preferably scans only a part of the total channels. More preferably, some of cable broadcast channels, not terrestrial broadcast channels are scanned or some channels that differ in channel numbers according to services provided by a cable system operator are scanned.

That is, it is preferred that the channel numbers and names of some channels to which different channel numbers are assigned in different regions or according to different subscribed services are determined by channel scanning, rather than the channel numbers and names of channels to which the same channel numbers are assigned irrespective of regions or subscribed cable services are determined by channel scanning.

The controller **170** may control input of some cable channels through the external device interface **130**.

Referring to FIG. **39**A, it is noted that a part **3930** of cable channels **3910** among total channels **3900** are scanned. That is, cable channels CH **81** to CH **85** may be scanned.

During scanning of some channels, the image display apparatus **100** determines whether an image indicating a channel name or a program name exists in a broadcast image of a broadcast signal received on each channel (S**3825**). In the presence of an image indicating a channel name or a program name in the broadcast image, the image representing a channel name or a program name is extracted (S**3830**).

During scanning some channels, the controller **170** determines channel number information about the channels according to the frequencies of the channels. The controller **170** also determines the names of the channels.

A cable broadcast signal provided by a cable system operator does not provide EPG information. Therefore, a log detection technique is used to determine the name of a channel in an embodiment of the present invention.

That is, the controller **170** of the image display apparatus **100** determines whether an image indicating a channel name or a program name exists in a broadcast image of a broadcast signal received on each channel. In the presence of an image indicating a channel name or a program name, the controller **170** extracts the image.

For example, a log image representing a channel name or a program name is located at a corner of a broadcast image. Therefore, the controller **170** may extract the image from a corner of the broadcast image, especially from the top right corner, top left corner, or bottom right corner of the broadcast image.

The image display apparatus **100** determines the channel name of the broadcast signal based on the extracted image (S**3855**). The controller **170** of the image display apparatus **100** may determine the channel name of the channel based on the extracted image. For example, if a logo image representing a channel name is stored for each channel in the memory **140**, the controller **170** may determine the channel name of the channel by comparing a broadcast image of the channel with the stored logo images.

In another example, the image display apparatus **100** may transmit the extracted image to the server **500** through the network interface **135** and receive channel name information corresponding to the image from the server **500**. The image display apparatus **100** may determine the channel name of the channel based on the received channel name information.

Referring to FIG. **39**A, it can be noted that the part **3930** of the cable channels **3910** among the total channels **3900** are scanned in the fast mode and the channel names of the cable channels CH **81** to CH **85** are determined. The channel names of the cable channels CH **81** to CH **85** may be MBC DTV, KBS1 HD, SBS HD, KBS2 HD, and EBD DTV, respectively.

The image display apparatus **100** transmits the determined channel number information and channel name information to the server **500** (S**3840**). Thus the server **500** receives the channel number information and the channel name information from the image display apparatus **100** (S**3940**). The controller **170** of the image display apparatus **100** may control transmission of the determined channel number information and channel name information to the server **500** through the network interface **135** during a partial scanning period.

For example, the image display apparatus **100** may transmit the channel number information and channel name information about the cable channels CH **81** to CH **85** illustrated in FIG. **39**A to the server **500**.

Besides the channel number information and channel name information, the image display apparatus **100** may further transmit location information (region information) about the image display apparatus **100** or information about a cable system operator that provides a subscribed cable broadcasting service (including information about the name of the cable system operator). Therefore, the server **500** may select a suitable channel map based on the location information or the subscribed cable system operator information in addition to the channel number information and channel name information.

The server **500** selects a matching channel map based on the received channel number information and channel name information. Specifically, the processor **720** of the server **500** selects a channel map matching to the channel number information and channel name information received from the

image display apparatus **100** from among various channel maps stored in the memory **740**.

Despite the same cable broadcasting channels, different channel numbers may be assigned to them in different regions or according to different subscribed services. In an embodiment of the present invention, a channel map is selected based on channel number information and/or channel name information about some channels, received from the image display apparatus **100**.

For example, the processor **720** of the server **500** may select a channel map matching to the channel number information and channel name information about CH **81** to CH **85** illustrated in FIG. **39**A.

Then the server **500** transmits channel number information and channel name information about a plurality of channels to the image display apparatus **100** according to the matching channel map.

The image display apparatus **100** receives the channel number information and channel name information about the plurality of channels (S**3845**).

The server **500** transmits the selected channel map through the network interface **730**. Specifically, the server **500** may transmit the channel number information and channel name information about the plurality of channels in the selected channel map. Therefore, the image display apparatus **100** may receive the channel number information and channel name information about the plurality of channels through the network interface **130**.

For example, as illustrated in FIG. **39**A, the image display apparatus **100** may receive a channel map **3940**. The channel map **3940** includes a channel map **3925** listing the channel numbers and channel names of terrestrial channels and a channel map **3920** listing the channel numbers and channel names of cable channels.

If the server **500** selects a plurality of channel maps, it may transmit the plurality of channel maps. For example, if there are two channel maps matching to the channel number information and channel name information about CH **81** to CH **85** in FIG. **39**A, the server **500** may transmit the two channel maps or channel number information and channel name information about a plurality of channels included in each of the channel maps to the image display apparatus **100**.

The image display apparatus **100** generates a channel map for the total channels (S**3850**). The controller **170** of the image display apparatus **100** may generate a channel map using the received channel number information and channel name information about the plurality of channels of the channel map.

Specifically, the image display apparatus **100** determines channel number information and channel name information about each channel during additional scanning and compares the determined channel number information and channel name information with the channel number information and channel name information about the plurality of channels, received from the server **500**. If the determined channel number information and channel name in formation are identical to the received channel number information and channel name information, the image display apparatus **100** may determine that the received channel number information and channel name information are valid. The image display apparatus **100** may generate a channel map for the total channels using at least one of the received channel number information or channel name information about the plurality of channels.

For example, the controller **170** of the image display apparatus **100** may control the tuner **390** to additionally scan a part (CH **12** to CH **18**) of terrestrial channels in FIG. **39**A and may determine channel number information and channel name information about each channel during the additional scanning.

The controller **170** of the image display apparatus **100** compares the channel number and channel name information about CH **14** to CH **18** with the channel map **3925** of the terrestrial channels received from the server **500**. If the channel number and channel name information match to the channel map **3925**, the controller **170** determines that the overall channel map **3940** received from the server **500** is valid.

Accordingly, the controller **170** finally determines the overall channel map **3940** received from the server **500** as a channel map for the image display apparatus **100**.

That is, the channel number information about the total channels **3900** can be acquired rapidly, simply by scanning about 12 channels instead of all of tens or hundreds of channels in the fast mode as illustrated in FIG. **39**A, as described above. In addition, the channel name information about the total channels **3900** can be acquired. Thus, an overall channel map can be configured readily.

Meanwhile, determination of a final channel map means termination of the automatic channel scan mode.

On the other hand, if the first scan mode has not been selected in step S**3815**, the image display apparatus **100** determines whether a second scan mode has been selected (S**3860**). If the second scan mode has been selected, the image display apparatus **100** scans all of the plurality of available channels (S**3865**). The image display apparatus **100** determines channel number information and channel name information about each channel during scanning the channel (S**3870**).

The controller **170** of the image display apparatus **100** determines whether the normal mode has been selected by a local key input or an input from the remote controller **200**. Upon selection of the normal mode, the controller **170** enters the normal mode.

Referring to FIG. **40**A, upon selection of the normal mode object **4016** in the automatic channel scan mode screen **4010**, the image display apparatus **100** may scan channels in the normal mode.

Referring to FIG. **40**C, upon selection of the 'No' object **4036** in the fast mode start screen **4030**, the image display apparatus **100** may scan channels in the normal mode.

The controller **170** of the image display apparatus **100** may control the tuner unit **110** to scan all of terrestrial channels and may also control the external device interface **130** to scan all of cable channels.

FIG. **39**B is an exemplary view illustrating scanning of the total channels **3900**. That is, all of the terrestrial channels **3915** are sequentially scanned and then all of the cable channels **3910** are sequentially scanned.

The controller **170** of the image display apparatus **100** may determine the channel number of each channel, while switching between the frequencies of the channels. In the case of terrestrial digital broadcast channels, their channel names may be determined from EPG information. In the case of terrestrial analog broadcast channels or cable channels, their channel names may be determined by detecting logo images from broadcast images of broadcast signals, as described before.

Compared to the fast mode, the total channels are scanned in the normal mode. Therefore, the channel names of the channels may not be determined, when needed. Determination of the channel numbers of the channels may be sufficient.

Upon completion of scanning the total channels, the controller **170** may generate a channel map using the determined

channel number information. If there are determined channel names, the channel names may be used in generating the channel map.

The fast mode may be one of a plurality of modes for automatic channel scanning. That is, the fast mode may be performed during automatic channel scanning.

As is apparent from the above description, in accordance with an embodiment of the present invention, upon selection of one of a plurality of broadcast programs in a broadcast program list, an image display apparatus transmits channel information about the selected broadcast program to a remote controller, receives a broadcast signal of the broadcast program corresponding to the channel information from a set-top box, and displays a broadcast image corresponding to the broadcast signal. Therefore, a user can readily view an intended broadcast program.

One of the plurality of broadcast programs can be selected in a program-based fashion without channel number information. Therefore, the user can view an intended broadcast program reliably.

As the remote controller communicates with the set-top box in a first communication scheme and with the image display apparatus in a second communication scheme, the image display apparatus and the set-top box can be easily controlled using the single remote controller.

In accordance with another embodiment of the present invention, while a broadcast signal of a detected broadcast channel is being received in channel scan mode, if an image indicating a channel name is included in a broadcast image, the channel name image is extracted and the channel name of the broadcast channel is determined based on the extracted image. Thus, a channel map can be easily generated using channel number information and channel name information, thereby increasing user convenience.

On the contrary, in the absence of a channel name image in the broadcast image of the broadcast channel, channel number information and channel name information determined for other broadcast channels are transmitted to a server, channel map information is received from the server, and a channel map is updated using the received channel map information. Therefore, the channel map is completed so that it may include channel names for all channels.

In the case where channel number information and channel name information are included in a broadcast signal of a received broadcast channel such as a digital broadcast channel, the channel number and channel name of the broadcast channel can be determined and stored in a channel map, thus updating the channel map.

In accordance with another embodiment of the present invention, the server receives extracted image information or channel number and channel name information from the image display apparatus, selects a matching channel map from among a plurality of pre-stored channel maps, and then transmits information about the selected channel map to the image display apparatus. Accordingly, the image display apparatus can readily complete its channel map.

The server receives channel number information and channel name information from a plurality of image display apparatuses. If channel number information and channel name information received from a specific number of image display apparatuses among the plurality of image display apparatuses are identical, the server generates a channel map using the identical channel number information and channel name information and registers the channel map as a new channel map, if the channel map does not exist in the server.

As the image display apparatus displays this channel map, user convenience can be increased.

Furthermore, the image display apparatus can receive real-time viewer rating information from the server and display an object indicating the received real-time viewer rating information. Therefore, a user can readily view the real-time viewer rating information, thus experiencing increased use convenience.

In accordance with another embodiment of the present invention, since the image display apparatus can receive detailed information about a displayed broadcast image from the server and display the detailed information, user convenience can be increased.

The server can receive an image indicating a channel name or program name from the image display apparatus and thus readily identify a broadcast channel received at the image display apparatus based on the received image.

In accordance with another embodiment of the present invention, when recording mode is set, the image display apparatus determines the presence or absence of an image indicating broadcasting information in a broadcast signal. In the presence of the broadcasting information image, the image display apparatus stores broadcast content corresponding to the broadcast signal. Therefore, the image display apparatus can record only user-intended broadcast content, thereby increasing user convenience.

Especially in the absence of a broadcasting information image, the image display apparatus does not store the broadcast content corresponding to the broadcast signal despite a recording time in the recording mode. Accordingly, the image display apparatus can record only user-intended broadcast content reliably, thereby increasing user convenience.

A specific broadcast program item can be selected for scheduling recording on an EPG screen according to user selection. The presence or absence of a broadcasting information image is monitored at a recording starting time according to a recording mode setting. Thus, only user-intended broadcast content can be recorded reliably, except an advertisement image.

Since a broadcast signal is monitored to detect a broadcasting information image more frequently at the recording starting or ending time, only user-intended broadcast content can be recorded reliably, thereby increasing user convenience.

In accordance with another embodiment of the present invention, upon receipt of an application execution input, the image display apparatus acquires information about a broadcast program and displays a related application. Therefore, the user can readily acquire additional information about the broadcast program, thus experiencing increased use convenience.

The user convenience is further increased because an application can be executed on a broadcast program basis.

If a related application has not been installed in the image display apparatus, the image display apparatus accesses the server and an application list from the server. Upon selection of an application in the list, the image display apparatus downloads the selected application and installs the application. Therefore, a user-intended application can be installed and executed simply.

The broadcast program information can be extracted from EPG information in a received broadcast signal or acquired based on a log image indicating a channel name or program name in a broadcast image of a broadcast signal. In the absence of an EPG, the broadcast program information can be acquired by logo detection. Thus, user convenience can be increased.

In accordance with another embodiment of the present invention, the image display apparatus scans broadcast signals of some channels in automatic channel scan mode. Dur-

ing scanning the channels, the image display apparatus extracts an image indicating a channel name or program name from a broadcast image of a broadcast signal from each of the detected channels, determines the channel names of the broadcast signals using the extracted images, and fast identify total channels based on the determined channel names. Accordingly, user convenience can be increased.

For automatic channel scan, an object that allows selection one of a first scan mode for fast channel scan and a second scan mode for scanning all channels is displayed to thereby increase user convenience.

In accordance with another embodiment of the present invention, the image display apparatus transmits its location information or cable system operator information to the server in the automatic channel scan mode. Then the image display apparatus receives channel number and channel name information about a plurality of channels from the server, scans broadcast signals of a part of the plurality of channels, determines channel number information and channel name information about the channels during the partial scanning, and fast identifies all channels using the determined channel number and channel name information. Therefore, user convenience can be increased.

In a further embodiment of the present invention, the server receives channel number information and channel name information, or location information or cable system operator information about the image display apparatus from the image display apparatus, selects a channel map matching the received information, and transmits channel number information and channel name information about a plurality channels included in the matching channel map to the image display apparatus. Therefore, the image display apparatus can search channels fast in the automatic channel scan mode.

The image display apparatus and the methods for operating the image display apparatus according to the foregoing exemplary embodiments are not restricted to the exemplary embodiments set forth herein. Therefore, variations and combinations of the exemplary embodiments set forth herein may fall within the scope of the present invention.

The methods for operating the image display apparatus according to the foregoing exemplary embodiments may be implemented as code that can be written on a computer-readable recording medium and thus read by a processor in the portable terminal and the image display apparatus. The computer-readable recording medium may be any type of recording device in which data is stored in a computer-readable manner. Examples of the computer-readable recording medium include a ROM, a RAM, a CD-ROM, a magnetic tape, a floppy disc, an optical data storage, and a carrier wave (e.g., data transmission over the Internet). The computer-readable recording medium can be distributed over a plurality of computer systems connected to a network so that computer-readable code is written thereto and executed therefrom in a decentralized manner. Programs, code, and code segments to realize the embodiments herein can be construed by one of ordinary skill in the art.

While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

What is claimed is:

1. A method for operating an image display apparatus, comprising:

displaying a broadcast program list listing a plurality of broadcast programs;

receiving, upon selection of one of the plurality of broadcast programs, a broadcast signal of the selected broadcast program;

displaying the received broadcast program, wherein the broadcast program list includes real-time viewer rating information, a thumbnail image, and a name for each of the plurality of broadcast programs;

extracting, in a presence of images representing a channel name or a program name in a plurality of images of a plurality of broadcast programs, the images representing the channel name or the program name from the plurality of images;

transmitting the extracted images to a server; and

receiving the real-time viewer rating information about the plurality of broadcast programs from the server.

2. The method according to claim **1**, wherein the reception of a broadcast signal comprises:

extracting, upon selection of the one of the plurality of broadcast programs, channel information about the selected broadcast program using a pre-stored channel map; and

receiving the broadcast signal of the selected broadcast program according to the extracted channel information.

3. The method according to claim **1**, further comprising receiving the broadcast program list from the server.

4. The method according to claim **1**, further comprising:

receiving detailed information about a displayed broadcast image of the broadcast program from the server; and

displaying the received detailed information.

5. The method according to claim **1**, further comprising:

determining whether an image representing broadcasting information is included in the broadcast signal, when recording mode is set; and

storing broadcast content corresponding to the broadcast signal in the recording mode, in the presence of the image representing the broadcasting information in the broadcast signal.

6. The method according to claim **1**, further comprising:

executing an application related to the broadcast program based on broadcast program information about the broadcast program, upon receipt of an application execution input; and

displaying the executed application.

7. The method according to claim **1**, further comprising:

entering a fast mode of automatic channel scan mode;

scanning broadcast signals of a part of a plurality of channels available to the image display apparatus, wherein the image representing the channel name or the program name is extracted during the scanning broadcast signals of a part of a plurality of channels available to the image display;

determining channel number information and channel name information about the broadcast signal corresponding to partially scanned channels based on the extracted image;

transmitting the determined channel number information and channel name information corresponding to the partially scanned channels to the server;

receiving channel number information and channel name information about the plurality of channels including the partially scanned channels from the server; and

generating a channel map using at least one of the received channel number information or channel name information about the plurality of channels including the partially scanned channels.

8. The method according to claim **1**, wherein the broadcast program list includes at least one of a broadcast program type

item, a real time ranking item, a daily ranking item, a weekly ranking item, or a monthly ranking item.

9. The method according to claim **1**, wherein the reception of a broadcast signal comprises receiving the broadcast signal of the selected broadcast program from a set-top box.

10. The method according to claim **2**, further comprising:

entering a channel scan mode;

receiving a broadcast signal of a detected broadcast channel in the channel scan mode;

determining channel number information and channel name information about the broadcast channel based on the extracted images; and

storing the channel number information and the channel name information about the broadcast channel in the channel map.

11. The method according to claim **10**, further comprising:

transmitting the channel number information and the channel name information to the server, in the absence of the images representing the channel name in the plurality of images of a plurality of broadcast images;

receiving channel map information from the server; and

updating the channel map using the received channel map information.

12. The method according to claim **10**, wherein the determination of channel name information comprises determining a channel name of the broadcast channel by comparing the extracted images with a logo image representing a channel name pre-stored or received through a network.

13. A method for operating an image display apparatus, comprising:

displaying a broadcast program list listing a plurality of broadcast programs;

transmitting, upon selection of one of the plurality of broadcast programs, channel information about the selected broadcast program to a remote controller;

receiving a broadcast signal of the broadcast program corresponding to the channel information from a set-top box;

displaying the received broadcast program;

extracting, in a presence of images representing a channel name or a program name in a plurality of images of a plurality of broadcast programs, the images representing the channel name or the program name from the plurality of images;

transmitting the extracted images to a server; and

receiving the real-time viewer rating information about the plurality of broadcast programs from the server.

14. The method according to claim **13**, wherein the broadcast program list includes real-time viewer rating information, a thumbnail image, and a name for each of the plurality of broadcast programs.

15. An image display apparatus comprising:

a network interface to exchange data with a server;

a display to display a broadcast program list listing a plurality of broadcast programs;

a broadcasting receiver to receive, upon selection of one of the plurality of broadcast programs, a broadcast signal of the selected broadcast program; and

a controller to control display of the received broadcast program,

wherein the broadcast program list includes real-time viewer rating information, a thumbnail image, and a name for each of the plurality of broadcast programs, and

wherein in a presence of images representing a channel name or a program name in a plurality of images of a plurality of broadcast programs, the controller extracts images representing the channel name or the program name from the plurality of images, transmits the extracted images to the server, and receives the real-time viewer rating information about the plurality of broadcast programs from the server.

16. The image display apparatus according to claim **15**, wherein upon selection of the one of the plurality of broadcast programs, the controller extracts channel information about the selected broadcast program using a pre-stored channel map, and the broadcasting receiver receives the broadcast signal of the selected broadcast program according to the extracted channel information.

17. The image display apparatus according to claim **16**, further comprising a memory to store the channel map,

wherein the broadcasting receiver receives a broadcast signal of a detected broadcast channel in a channel scan mode, and in the presence of an image representing a channel name in a broadcast image of the broadcast signal, the controller determines channel number information and channel name information about the broadcast channel based on the extracted images, and stores the channel number information and the channel name information about the broadcast channel in the channel map.

18. The image display apparatus according to claim **17**, wherein the network interface is configured to transmit the channel number information and the channel name information to the server, in the absence of the images representing the channel name in the plurality of images of a plurality of broadcast images and to receive channel map information from the server, and

wherein the controller updates the channel map using the received channel map information.

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